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VIEWS, NEWS AND INTERVIEWS.

Henry M. Whitney, president of the West End Railway Company, of Boston, has given $500 to the electrical laboratory of Williston Seminary, where he was a student in the class of '59.

An installation of electric light is being laid down in the Batignolles tunnel just outside the Gare St. Lazare, at Paris, that is likely to be as useful as it is original. Nine hundred incandescent lamps will be disposed along the tunnel, 150 along each side of the three sections. They will be placed at a height of about 16 feet above the rails, which would put them beyond reach of any obstacle. Each lamp will be inclosed in a strong sheet iron box, and the light will be thrown on the wall by means of a powerful reflector. This light will be received by plates of burnished tin, covered with glass, which will be placed at a height of six and one-half feet. These will, in turn, reflect a soft and agreeable light into the carriages. Obviously, if these lamps were constantly in use their cost would be something considerable, so, in order to economize as much as possible, the lamps will be automatically lighted by the train, and only that part of the two walls directly opposite the train will be at one time illuminated. To avoid unnecessary danger to the workmen, it is proposed to place 20 lamps overhead in each section of the tunnel, which will be kept permanently lighted.

Nine lines of telegraph wires conveyed the news of the function held by Mr. John L. Sullivan and Mr. James J. Corbett, from the Olympic Club, at New Orleans, to the waiting world.

An electric phæton built in Indianapolis has been shipped to Chicago, where it is designed for use at the World's Fair. It will carry two passengers on the same seat, and the motorman on the rumble. The motorman will guide with one hand and with the other apply or shut off the current, which is generated by six cells located under the main seat. The current is transmitted to a one-half horse-power motor. The phæton is designed to carry passengers through the various buildings and walks of the World's Fair.

Between rapid transit and blocked sidewalks, pedestrianism in Pittsburgh promises to become a lost art.—*Pittsburgh Dispatch.*

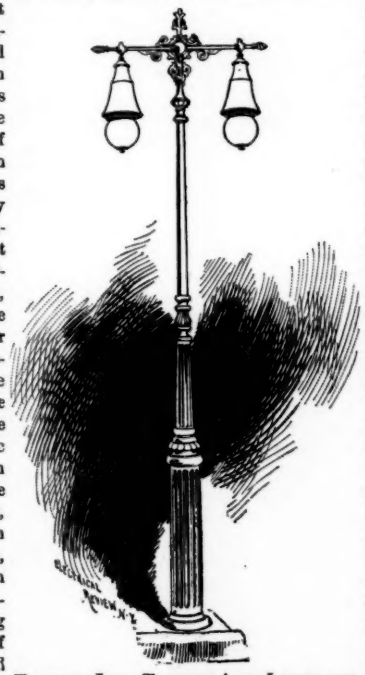
"What a wonderful thing electric light is." "Yes, it is wonderful. I expect after a while it will be used to make the crops grow instead of the sun." "There are some crops that now thrive by electric light." "Nonsense!" "No nonsense about it. There are lots of young men here in New York who sow most of their wild oats by the electric light."—*Texas Siftings.*

Henry Villard has withdrawn from the General Electric Company. H. C. Payne, of Milwaukee, says Mr. Villard's retirement from that company does not affect his interests in the Milwaukee Street Railway Company.

Electric Lights for Fifth Avenue.

One of the late important matters electrical is the awarding of a contract to light Fifth avenue, this city, which for the past year has been but feebly illuminated at night by old-fashioned gas lamps. A new style of arc lamp designed for use on low tension circuits, the invention of E. Bergmann, president of the New York Electrical Equipment Company, will be used. Mr. R. R. Bowker, first vice-president of Edison Electric Illuminating Company, was interviewed by a REVIEW representative on the subject. Mr. Bowker said:

"The essential feature of the new system of street lighting developed by the Edison Electric Illuminating Company, of New York, with special reference to the lighting of Fifth avenue, is the employment instead of a single arc lamp of a pair of arc lamps on one post, each lamp taking five amperes of current at the usual arc lamp voltage, approximating 50 volts. This practically uses the same amount of current as the single arc lamp worked by the high tension companies in serious circuit, but has the double advantage of permitting connection with the Edison mains without running any special circuit or connecting wire from post to post, whether overhead or underground, and of giving a more effective light of better diffusion, so that absolutely no shadows are cast, thus avoiding the chief objection to the ordinary street arc lighting. The plan contemplates the use of ornamental posts, practically made in three parts, the base, the shaft and the arm section. The resistance, instead of being placed in the hood of the lamps, is provided for within the base, and the lamps are raised and lowered from within the shaft, access being had by a door which opens in the base, the key of which will be carried by the trimmer.



TYPE OF LOW TENSION ARC LAMPS AND STANDARD TO BE USED IN LIGHTING FIFTH AVENUE, NEW YORK CITY.

"The lamps are fed by a sliding contact in the hood, so that when the lamps are lowered they are automatically cut off from the current and are absolutely dead. No climbing of poles is required for the trimmer, and there is no chance of obtaining even a low tension shock when the lamps are trimmed. The current is to be supplied from the Edison mains by the ordinary house service method, the supply wires running through the gas pipe, which forms the center part of the shaft. The hoods and the posts will be of ornamental pattern, and the type of lamp adopted will probably be a new arc lamp developed by the New York Equipment Company. This system of street lighting is believed to be entirely novel, and it will be an important development for the local Edison companies throughout the country."

Fifty poles will be erected at intersecting streets from Washington Park to Fifty-ninth street. A pleasant feature of this revised system of lighting is that it has had its outcome from requests of the property owners on Fifth avenue, rather than from any political intervention. For some time past the residents of Fifth avenue have been agitating the subject of improved facilities for lighting, because of the objections to the usual unsightly method. We congratulate the Edison Electric Illuminating Company, as well as the residents of Fifth avenue, on the results which will be obtained on the completion of this contract, which will go far toward beautifying New York's representative thoroughfare.

London News.

At the International Horticultural Exhibition, at Earl's Court, recently, an entertainment of a novel and interesting character was afforded by the Messrs. Crompton. A large table was covered with a variety of electric apparatus, the uses of which were admirably explained and illustrated. The lecturer, after showing the great advantages of electric light for illumination and for ornament, went on to describe the application of the electric current to the production of heat, especially for domestic purposes. With the heating of stoves, foot-warmers, flat-irons, etc., we had been made familiar recently at the Crystal Palace; but it was something novel to see a lady take up a curling-iron, and, heating it almost instantaneously by electricity, demonstrate on her own disheveled locks its excellence and efficiency. Perhaps the most generally interesting exhibit was the cooking apparatus. There was a kettle and heater combined, a valuable adjunct to the tea-table; tea, coffee and cocoa; heaters suitable for restaurants; sauce-pans and frying-pans of various shapes and sizes. A practical demonstration of the usefulness of these appliances was then given by an experienced cook, who went through the process of cooking cutlets, peas, pancakes, etc., various samples of which were handed round to the audience and pronounced excellent. Dealing with the question of cost, the lecturer estimated that at 8*d.* per Board of Trade unit (now the highest charge), the cost of the heaters would be 1*d.* per hour per heater; while, at the day price of the St. Pancras current, the cost would not exceed ½*d.* per hour. There can be no doubt but that a wide field is thus opened for the application of electricity, and, as the price of current is cheapened, electric appliances for cooking and other domestic purposes, combining as they do to such a large extent cleanliness, rapidity and economy, will shortly be brought into very general use.

LIGHT AND POWER STATIONS.

SOME HINTS TO OWNERS AND OPERATORS BY A PRACTICAL ENGINEER.

Character and General Plan of Station Buildings — A Permanent Home Should Be Erected—Prepare for the Increased Load Which Is Sure to Come.

BY ROBB MACKIE.

VI.

Having determined the location of the station with due reference to the balancing of the economies, as previously pointed out, the next element to be taken into consideration is the character of the buildings to be erected and the general plan of the same.

Of course, much will depend on the conditions that surround the particular enterprise, and it is extremely hard to lay down rigid rules for guidance of the uninitiated, but too much stress cannot be laid on the fact that this is to be the *permanent home* of the entire undertaking, and, therefore, should be a suitable one in every particular. Too much thought cannot be given to the design and arrangement of the station itself, for on this more than on almost any other feature will depend the economical handling of the entire plant, and especially of the station machinery with its consequent reduction to a minimum of the item of "station labor," and this item has a far greater bearing on the dividend earning capacity of the plant than the uninitiated are apt to give it credit for, while it is really astounding to see how much more can be accomplished by a given number of men in some stations than in others, due allowance at all times being made for the difference in the men themselves and the way they are managed, owing entirely to the better arrangement of the various departments with reference to each other, and the grouping of different classes of machines in a way to allow the minimum number of attendants to accomplish the maximum amount of work. This is one of the points where it is possible to arrange in advance for true economy of operation, and every little feature taken advantage of that will tend to reduce the labor that is required from the attendants will mean just so much higher a percentage of profit earned by the undertaking.

Too often in the past has the design of the station been considered a matter of minor importance, resulting in the erection of a clap-trap affair of a building, not in the least particular suitable for the smallest kind of a station. Common sense teaches that it is of far greater importance to consider the economy of operation of the plant, and while designing, give more thought than has been usual to the well-known fact that the load *will* increase beyond even the most sanguine expectation, provided, of course, the business is properly handled, necessitating increased facilities; therefore, the plant should be designed to permit this increase, not necessarily by making provision for it all at the outset, but by making designs that will allow first a considerable increase of machinery over what is at first thought necessary, then, after all available space is occupied, to permit of additions to the buildings in a man-

ner that admits of adding machinery to that in operation, upon a plan that comprehends the necessity of running all as far as practicable upon an interchangeable basis.

This very important factor in the many that go to make up the whole is one requiring a most careful weighing of the many "whys and wherefores" but, unfortunately, we too often find an astonishing absence of the proper care and forethought in going over

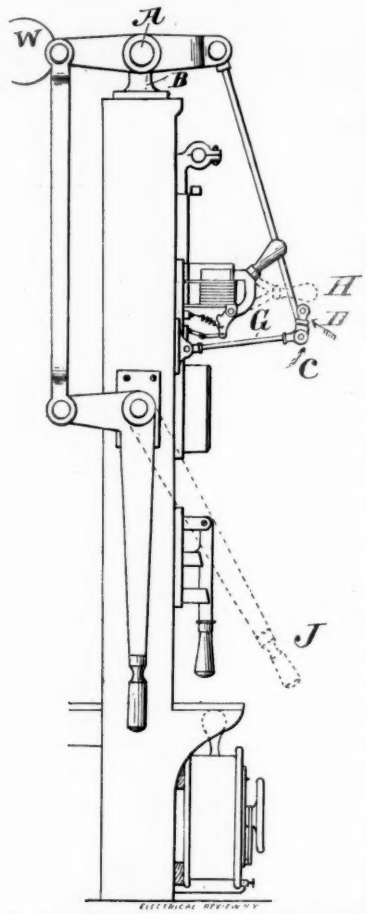


FIG. 1.—END ELEVATION OF SWITCHBOARD IN BROOKLYN CITY RAILROAD'S POWER STATION.

the many illy designed stations in the country now dragging out an uneconomical existence.

By calling these two allies, care and forethought, to our aid in this work, many needless expenditures can be avoided otherwise made necessary, when by growing business it becomes imperative to change the arrangement of the machinery to allow of increased station facilities. These changes, as previously pointed out, are always expensive, even if the work can be accomplished without entirely shutting down the plant, and while a station when first built and equipped may have a lop-sided appearance and not be as artistic with engine, shafting and dynamos over at one end, instead of gracefully reposing in the middle of the room, it will be found when the time comes, as it surely will, for a necessary increase of the plant, that less of the graceful and more of the practical will be a great advantage in enabling the same to be made without any change of the running machinery.

(To be continued.)

Electric Lighting at Gibraltar.

[From *Lightning*, London.]

How strange the electric light will look at Gibraltar, throwing up the scars and wrinkles of the old Moorish battlements, the tortuous lanes and twisted markets and the uncompromising British symmetry of the barracks, moles and forts, which serve them for a foil.

I was "interned" for some five years of my very early youth in this historic fortress, and I rather envy Mr. Preece the interesting work of preparing a specification and drawing out a plan for the installation. A high tension system, I hear, is in his mind, owing to the scattered nature of the district.

THE TROLLEY IN BROOKLYN.

The Alleged Dangers of the Trolley and Cable Systems Compared—So-called Accidents Due to Mechanical Causes—Brooklyn Authorities Recognize the Advantages of the Trolley—The City Across the Bridge Will Have 190 Miles of Trolley Lines—A Good Example for New York.

BY JULIAN A. MOSES.

The question of the adaptability of the trolley system to passenger transportation is one which is agitating the minds of all who take an interest in municipal economics. Great bodies move slowly, and the people of this city are slow to make radical changes. There are always different forces at work that further or retard the progress of any large enterprise. At the present moment the daily papers seem to be doing all in their power to prevent the introduction of the trolley into this city. They undoubtedly have their reasons, but is it just or fair that misleading and utterly false statements should be published? They convey ideas that are calculated to terrorize the community at large and make the people think that this city is about to be invaded by a deadly machine that intends to number its victims by the thousands. This is radically wrong. Yet this is what the daily press is trying to do. It is not right that the technical journals should stand idly by and see these outrages on the understandings of the people committed daily and not say a word in defense. The ELECTRICAL REVIEW has made good progress in its crusade against this falsifying of facts by the press, and it is hoped that the good work will go on. The following is but a mild sample of the highly colored and exaggerated paragraphs that can be seen in the daily papers:

THE TROLLEY'S FATAL SCORE.

Score three more deaths for the trolley. Frank Gorman was crushed and killed at King's Highway, on the Coney Island and Brooklyn road. Also yesterday, just out of Auburn, a horse was frightened by a noisy trolley train, and through his antics managed to throw out upon the track directly in front of the motor the two young men who were riding in the carriage behind him. Both were instantly killed. These accidents were both out on open roads. Think how the chances for fatalities from the same source would be increased in New York streets. The trolley should be kept out of New York.

These and similar editorials are, to put it mildly, simply misleading. The cable cars are about to be introduced into the most crowded thoroughfares. Accidents will occur. Let us suppose a case, one that is liable to happen any day in this city. We are undoubtedly privileged to do this. But first we will make a little substitution. In an algebraical equation a substitution can only be made where the value of the quantity is not altered. Now, the speed of the trolley car and the speed of the cable car can be made equal quantities; and the number of feet in which the trolley and cable cars can be stopped may be made, and, as a matter of fact are, just the same, depending entirely upon the strength of the brakeman in charge. Let us also say that the noise from a motor on a trolley car, and the noise from a cable car when the brakes are applied, are both liable to frighten a balky horse. Having our quantities exactly equal, we shall proceed to make a perfectly plausible and logical substitution. The editorial before quoted would appear as follows:

THE CABLE CAR'S FATAL SCORE.

Score three more deaths for the cable car. John Smith was crushed and killed yesterday at Fifty-seventh street on the Broadway cable car line. Also yesterday just out of New York, a horse was frightened by a cable car and through his antics managed to throw out upon the track directly in front of the cable car the two young men who were riding in the carriage behind him. Both were instantly killed. These accidents were both out in open roads. Think how the chances for fatalities from the same source would be increased in New York streets. The cable car should be kept out of New York.

Have I exaggerated? Are not all my conditions such as could happen under the most favorable circumstances? And yet there is no outcry against the cable lines. Down our principal thoroughfare has this line been laid, and no objection has been made by the press. Why is this? Have the cable lines particular influence with the papers; or is it that the papers have no special objection to them? They have been tried on the 125th street line and have not been found wanting. Why should they be found wanting in vehicle-crowded Broadway? Possibly a few accidents will happen; the thing will be a nine days' wonder, and all will be quiet again. But they do not seem to give the trolley any showing whatever in this city, and condemn it before it has even been tried in closely crowded thoroughfares. The accidents that have happened were not in the least due to the presence of electricity but merely to the mechanical parts, and were such as could happen to the most harmless vehicle in existence.

The authorities of the city of Brooklyn have seen the many advantages to be derived from the trolley system and have constructed a road, at present some 12½ miles in length, which has succeeded admirably, and has done all that could be expected and that was expected for it to do. Is it that Brooklyn is a more progressive city than New York, or is it that we are behind the times? Brooklyn has the cable road and finds it, as far as it goes, perfectly satisfactory, except when a cable breaks or when some other similar accident occurs. Brooklyn also has her trolley cars, and is not only satisfied with what they are doing, but the people are so well pleased with their workings that the authorities are at present making plans for the construction of 110 *miles more of trolley lines*, and have already started on the construction of some of them. They are putting up a magnificent building at the corner of Fifty-second street and First avenue, in Brooklyn, which will be, when finished, one of the grandest power stations in the country.

In order to find out the cause, if any, for this difference, I made a trip to the City of Churches, and, obtaining permission from Mr. D. F. Lewis, the president of the Brooklyn city lines, to inspect the power house and system of the company, I took the Court street horse cars, which connect with the trolley cars at Twenty-fifth street and Third avenue. Here the trolley cars took me to the power house, which is situated at the corner of Second avenue and Fifty-second street. A communicative conductor was on the car that I took. He seemed to be glad to let me have some information about the trolley in the South, from which part of the country he had but recently come. He informed me that most of the progressive Southern towns had adopted the trolley system, and that the cars gave entire satisfaction. In the course of the conversation he mentioned that in all his experience, which was of three or four years' duration, he had witnessed but one accident and that one was caused by rank carelessness. He seemed to be in a story-telling mood, so I requested him to relate the incident.

"Well, sir," he said, "it was the funniest thing I ever saw. We were coming down S— street about 6 o'clock in the afternoon, and were going along at a pretty easy rate. About a block away from us was an old negro whose business it was to wash the windows for the store-keepers. He used a hose for this purpose, and one day (about a week before this, that I was telling you of, happened) he had his hose laying across the track, and the driver of this car had asked him, in not the most polite or quiet tone of voice, to 'take his blamed hose off of the track, or he'd run over it and cut it in two!' This angered the old colored gentleman, and ever since then he had had a spite against the driver. Lately, in some unknown way, the spite had become so aggravated that he fairly detested him. We came down the track, and there in front of us was that darkey spraying the windows. He spied the driver and just waited for him. There seemed to be some mischief brewing, for he kept on spraying on one spot of the window-pane until the car reached him. His intention was evidently to deluge the driver with water, for with one mighty sweep he turned around to play the hose on him. But that intention was never realized, for as soon as the stream of water struck the trolley wire that old darkey dropped like a shot and yelled like a Comanche. He had received the current from the line right through his body, and it was a few minutes before we could restore him to his usual way of thinking. You never saw a more scared looking darkey in all your life. He swore that 'the Almighty had struck him for trying to do evil,' and he vowed from that moment never to trouble the driver again. The driver made the most of the opportunity and impressed on the mind of our colored enemy that it was best to return good for evil. The shock

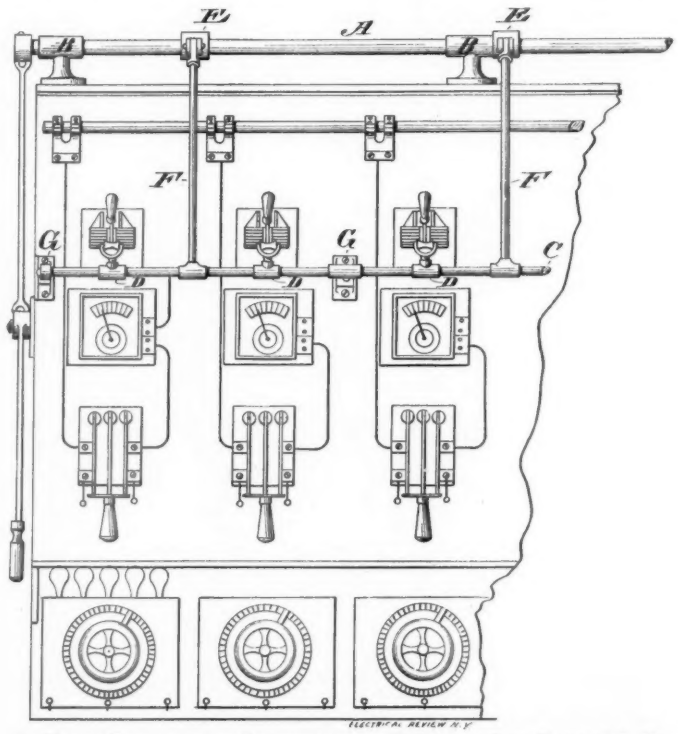


FIG. 2.—FRONT ELEVATION OF SWITCHBOARD IN BROOKLYN CITY RAILROAD'S POWER STATION.

did not hurt him in the least, but he was thoroughly scared."

The current from one of the generators is generally of about 500 or 600 volts, and is not able to do any harm to human life, but is more likely to frighten than to cause any decided damage.

In the city of Brooklyn there have been no accidents resulting from the electrical apparatus on the car or from the trolley wires.

The power house of the Brooklyn City Railroad as it now stands is about 160 feet long, and is divided up into the boiler room,

which is 60x50 feet, and the engine room, which is 100x50 feet. There are behind this building, to the south, several others, which are used as repairing shops and car sheds.

The engine room is situated at the extreme northern part of the building, and is thoroughly equipped and well lighted. The equipment consists of four McIntosh & Seymour double compound engines of 400 horse-power capacity, which have a speed of 200 revolutions per minute, and are arranged for driving four Thomson-Houston "M. P. 90" dynamos, which are built for 535 volts and 80 amperes. They were originally intended to be run with exciters and at a speed of 700 revolutions, but it was found best to do away with the exciters and increase the speed to 750 revolutions.

There has been found considerable difficulty heretofore in oiling the crank and shafts of these high speed engines. But the device used here, invented by the chief engineer, Mr. James Anderson, and known as the Anderson & Horton automatic lubricating system, has entirely done away with these difficulties. By its use the constant danger that the engineer puts himself into when oiling his engine is entirely avoided, and there is practically no waste of oil, as the device is automatic.

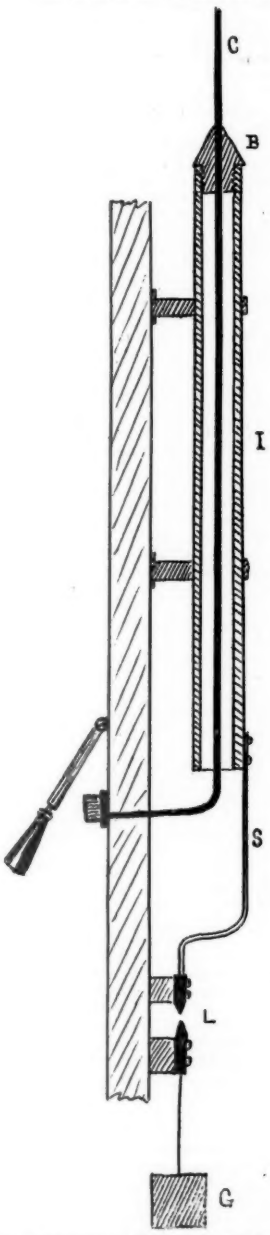


FIG. 3.—SECTIONAL VIEW OF LIGHTNING ARRESTER USED IN BROOKLYN CITY RAILROAD'S POWER STATION.

The switchboard, which is made of wood, slate having been found unequal to the demands made upon it, owing to the moisture that accumulates upon the surface in damp weather, is thoroughly equipped with the latest devices for making and breaking the circuits, in case of short circuits, accidents, or injuries to the machines, either in or out of the power house. Thomson-Houston ammeters and voltmeters are the measuring instruments used.

Figs. 1 and 2 show the rather ingenious arrangement of the switchboard.

The resetting device is particularly worthy of notice, for it accomplishes work which would otherwise require the entire and close attention of one man.

The shaft "A" rests in the supports "B" "B" on the top of the switchboard. The size of this shaft depends on the number of machines. This one has a diameter of $1\frac{7}{16}$ inch. The rod "C," on which the adjustable rollers "D," "D," "D" are attached, is kept at a suitable distance from the board by the swinging brackets "G" "G," and is connected to the arms by the rods "F" "F." The dotted lines at "H" show the position of the handle when the breaker is blown out of the circuit. The dotted lines at "J" show the position of the resetting handle when the breakers are thrown in.

This device was designed by Mr. James Anderson, the chief engineer of the power house, and was built by him and his assistants.

In all the time that the plant has been in existence it has never been injured in any way by lightning, although during every thunder-storm the lightning has been seen playing on the trolley wires. The company claim that this is due to the lightning arrester, invented by F. F. Pearson, of Boston, used in conjunction with an ordinary Thomson-Houston serrated lightning arrester, a drawing of which is shown in Fig. 3. The apparatus consists of an iron tube "I" through which the conductor to the line "C" passes, terminating in a brass cap "B" which screws into the tube. At the extreme end of the iron tube is attached a broad strip of copper "S" which connects with the ordinary lightning arrester "L," and from here a wire passes to the ground "G."

At the southern end of the engine room is placed a Davidson feed pump and two Hancock inspirators. A National heater completes the outfit for the engines.

The Thomson-Houston dynamos when first put up were intended to be used in conjunction with an exciter. When the company first started the line, these exciters were called into use, but of late they were found to be superfluous and have been dispensed with entirely. They will be used later as motors and are expected to be more valuable in that capacity than in that of exciters.

The loads that are carried at different times of the day, both daily and Sunday, are tabulated in Figs. 4 and 5. These cards show very accurately what are the habits of the residents of Brooklyn. A complete record of these cards is kept on file and at the end of the year make a highly interesting book illustrative of the character of the people.

These cards, half of each of which are shown, indicate the load that the engines had to bear, but by simply substituting people for amperes we can easily see the record in human load.

The first card is the record for the afternoon and evening of August 20, 1892. At the first, 12 P. M. of the morning, there are some people who are returning from the dissipations of the previous evening, but their numbers are few. This speaks well for the city of Brooklyn. Now the traffic decreases until the hour of 2 A.M. is reached, and from here to 4 A. M., the traffic is at a minimum. It again increases until we get to 6 o'clock, when we have the first division of laboring men who are going to their work. The load now decreases and makes a jump until at 7 o'clock we find the second and largest group of working men going to their respective places of business. From now to 12 M. the traffic is rather irregular, when we see that it is at its lowest for the working day. Here it suddenly takes a jump. It now varyingly increases until at 3 o'clock, the hottest part of the day, when perhaps more business is done. The curve continues irregular until 5 o'clock, when the people are returning from work. From here on, the decrease is steady until 12 P. M. is reached once more. Each of the week days has its own peculiarities, and, as a matter of fact, there are very few days that are exactly the same. There is always some distinctive difference, that will show in an instant to the engineer at the power house for what day the record is, provided he is informed of the month of the year and the weather conditions.

In Sunday's card there is considerable

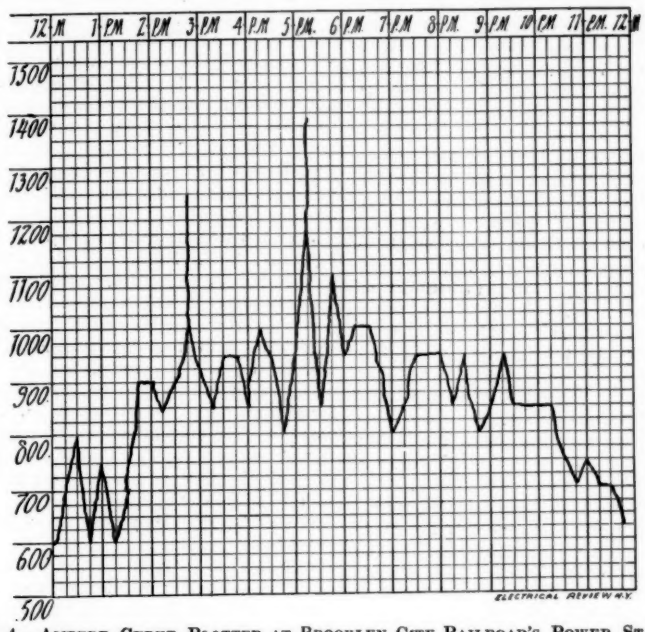


FIG. 4.—AMPERE CURVE PLOTTED AT BROOKLYN CITY RAILROAD'S POWER STATION, AUGUST 20, 1892, SHOWING CONSUMPTION OF CURRENT FROM NOON TO MIDNIGHT. WEATHER, CLEAR AND COOL.

difference, first, in the amount of traffic, and, second, in the disposing of it. The greatest difference will be noted at the hours of 3 and 7 P. M. This road runs to Coney Island, and it will be seen from this that these hours are those in which the people are going to and returning from that place, there being no business done in the city on that day. These curves offer a chance for the study of the habits of the people of a city that could not be obtained in any other way.

The lines of the company as they are now are divided into ten divisions; five

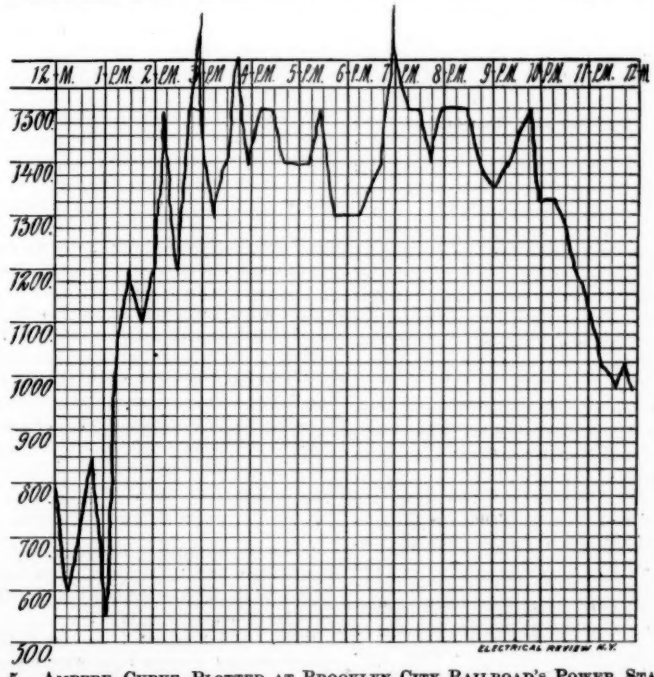


FIG. 5.—AMPERE CURVE PLOTTED AT BROOKLYN CITY RAILROAD'S POWER STATION, AUGUST 21, 1892, SHOWING CONSUMPTION OF CURRENT FROM NOON TO MIDNIGHT. WEATHER, CLEAR AND WARM.

divisions on the Third avenue line, and five divisions on the Second avenue line, each of which is controlled by a cut-out at the power house. The divisions are as follows:

THE SECOND AVENUE DIVISION.

No. 1. Bensonhurst to Eighty-sixth street and Twenty-fifth avenue.
No. 2. Eighty-sixth street and Twenty-fifth avenue to Sixty-fifth street.
No. 3. Sixty-fifth street to Fifty-second street.
No. 4. Fifty-second street to Thirty-ninth street.
No. 5. Thirty-ninth street to Bay Ridge and Thirteenth avenue.

THE THIRD AVENUE DIVISION.

No. 1. Fort Hamilton to Eighty-sixth street.
No. 2. Eighty-sixth street to Sixty-seventh street.
No. 3. Sixty-fifth street to Thirty-ninth street.
No. 4. Thirty-ninth street to bridge.
No. 5. Bridge to Hamilton ferry.

The tracks of the company have given entire satisfaction, the rails being of 65 pound iron and covered with extra heavy tinned copper. The trolley wire is No. 0, and the contact is very nearly perfect along the line. The only place where they have any trouble whatever in that respect is near the power house, where the sand is liable to drift upon the tracks on a windy day. However, a little pushing of the car or brushing off of the track is all that is necessary to overcome this difficulty.

The company owns at present about 75 motor cars, which weigh from seven to nine tons each. They are 32 to 34 feet in length, and are equipped with the Thomson-Houston "W. P. 50" motors with single reduction gearing. The motor itself is remarkably simple. This quality is a great desideratum to the repairer, when the cars are obliged to travel over sandy roads, for the sand plays sad havoc with machinery when it gets into the bearings. A small machine shop in the rear of the building is, however, sufficient for all repair purposes.

The armatures of the motors are so ar-

ranged that a short circuit is practically impossible, in fact, the only way in which a short circuit can be made is for the bolts to become unscrewed and fall down into the core. This accident has happened, but it is comparatively rare, and it has required but a short time to repair the motor.

There are now being made for the company 110 new motor cars to equip the 190 miles of the new road to be built. Those cars that the company now owns were manufactured by Jones, Brill and Lewis & Fowler, and are giving entire satisfaction. Carbon brushes are used on the motors, as all other kinds have been found practically useless for the work.

The poles on which the wires are strung are 28 feet long; being set six feet into the ground, they project 22 feet above it. They are planted 130 feet apart. The trolley wires are protected from falling telephone and telegraph wires by guard wires, which run parallel with them and about six or eight inches away.

So far no accidents have happened from this source, and it is supposed that only a cyclone or a very heavy storm will cause the wires to be short circuited. No danger need be apprehended even then, for there is the automatic device at the central station that will shut off the line if a short circuit is made.

The company has been especially fortunate in its road-bed, for most of the line is perfectly level; the heaviest grade is on the Bensonhurst division, and it is not more than three per cent. at the greatest.

The city ordinance will allow only a speed of ten miles per hour on the line, but the cars are seldom run at that speed. Six or seven miles per hour is the highest that they ever attain.

As regards stopping the cars, there is no limit to the rapidity with which this can be done. The motor can be reversed immediately, so it is solely dependent on the strength of the brakeman and the steadiness of his nerves. The brakemen now employed by the company claim that they can stop their cars when going at full speed within a distance of 30 feet.

The following are a few figures kindly furnished me by Mr. M. G. Starrett, chief engineer of the power house division, showing some important statistics relating to the expenditures of the plant:

Station expenses for week ending August 21, 1892: Coal for power, 344,715 pounds; oil for dynamo, 24 gallons; oil for cylinder, 6 gallons; waste, 38½ pounds. Station load: Average amperes, 702; average voltage, 526; average number motor cars, 52; average amperes per car, 135. Car mileage: Motor car mileage, 36,248; tow car mileage, 6,128. Total, 42,376.

An approximate idea of the expenses of running a plant similar to this may be easily seen from these figures. It was impossible to get the figures relating to the pay roll, but these may be ascertained from records of the street and cable car companies that are open to the public.

Philadelphia's Tax on Telegraph Lines.

Referee Robert Sturgis, of New York, has filed in the Supreme Court a report in favor of the city of Philadelphia in its action to recover license fees from the Bankers' and Merchants' Telegraph Company and the Postal Telegraph Cable Company for poles and wires in that city. The Councils of Philadelphia imposed in 1885 a yearly license fee of $1 on every telegraph pole in the city and $2.50 on every mile of wire. The Bankers' and Merchants' Telegraph Company, whose obligations were afterward assumed by the Postal, have maintained 551 poles in that city from 1885 to the present year, and an average of about 370 miles of wire each year. The companies denied the right to impose these license fees. The referee, however, decides that the poles and wires imperil the safety of pedestrians and that the license fee was properly required. The city had used these fees to have the poles regularly inspected. He decides that the companies must pay the city of Philadelphia $11,805 for those years, with interest and costs.

Prof. Alexander Graham Bell.

A TALK WITH THE INVENTOR OF THE TELEPHONE—ITS FUTURE CONSIDERED AND SOME NEW VIEWS ADVANCED.

Prof. Alexander Graham Bell, the inventor of the telephone, was interviewed recently in Boston. A representative of *The Journal* (Mr. W. E. Bryant), who wrote in 1876 the first description of the telephone that was ever published, just before Prof. Bell obtained the patent over which so much controversy has arisen, called on him and renewed a pleasant acquaintance begun 16 years ago, when Prof. Bell was connected with the Boston University, and when he was perfecting the system of visible speech for the deaf which his father had invented years before.

Time has laid his hands lightly on the professor's head. He has scattered silver through his hair and beard, which 16 years ago were jet black, and has added to the inventor's avoirdupois about 50 pounds, but time has not dimmed the genial eye or changed the winning smile; nor has he taken one jot or tittle from the cordial manner of Prof. Bell. The voice is as low and tuneful as when the professor was struggling to make a name and a fortune, and he has the look of a man who is on good terms with the world and himself.

"What has brought you to Boston, Professor Bell?"

"To defend my reputation. I had supposed until recently that I needed no defence; that the Supreme Court of the United States had decided that I was an honest man, so far, at least, as my relations were identified with the telephone. I find, however, that even that august judicial body does not always satisfactorily adjust the affairs of man.

"But, joking aside, I learned that in some peculiar manner (peculiar at least to me) my name was connected with the word 'fraud.' I learned that a commission was to meet in Boston to ascertain, if possible, if I were really the first inventor of the telephone. If the honors conferred upon me indirectly by the Supreme Bench of the United States were deserved. So I voluntarily came here, and for 53 days I have been questioned and cross-questioned, until I really am bewildered by the legal maze in which I have been surrounded and encompassed."

"What was the nature of this cross-examination?"

"The story is too long to tell. If you were to go back and consult the files of the Boston *Journal* you would get a clue to the case. It was really a threshing over of the old straw, which was pretty effectually beaten and shaken up before the courts years ago, when an attempt was made to show that I was not the inventor of the telephone, or that some one else had prior claim to the patent which I received, and which the Supreme Court decided I was entitled to. This revival of the case seems to have grown out of the Garland scandal, when the name of the United States was improperly permitted, for a period, by President Cleveland's attorney-general, to be used in prosecuting the claim of the Pan-Electric people."

THE POSSIBILITIES OF THE TELEPHONE AS FIRST VIEWED BY THE INVENTOR.

"Did you appreciate, Professor Bell, the possibilities and tremendous scope and influence of the telephone when you described your invention to me in 1876?"

"No, I did not; but I was much more sanguine of its success than were my business associates at that time. Like all inventors, I saw what no one else could see at that early day. I saw a fortune for some one and hoped that it might be for me. But really, you newspaper gentlemen have placed my fortune too high. You are responsible for a too exalted impression in the mind of the great public as to the colossal proportions of my estate. I am said to be a millionaire, and people charge me for everything as if I were a millionaire. The telephone has made large fortunes for many men who were courageous enough in the infancy of the invention to invest in the enterprise, but the amount of money made by telephone companies is not so large as the public supposes.

"Has the telephone reached its highest stage of improvement, did you say? Oh, no; I sincerely believe that its possibilities are much greater than any of us imagine. What we must now do is to discover some method by which to simplify the complicated system which has grown up and surrounded my original invention. The telephone proper is the same to day that it was 15 years ago, when the first line was run from Somerville to the office of Stone & Downer, the State street bankers and brokers. Mr. R. C. Downer, now president of the Broadway National Bank, was really the first to use the telephone, and when I recall the crude manner in which the line was then constructed, I am surprised that it worked at all.

"In the Summer of 1876, when you so kindly published a sketch of my invention, and when the Boston *Journal* told the world about my achievements, I could then talk as far as North Conway, N. H., and south to New York. The night when you were obliged to decline an invitation to meet myself and Sir William Thomson, the celebrated English electrician, who has since been made a peer of Great Britain in recognition of his invaluable contributions to science, I had secured the use of the line of the then Mutual Union Telegraph Company, and we conversed with New York, but, of course, the conversation was not so easily carried on as it has been since the construction of what is known as the metallic circuit.

"At the outset we experienced a difficulty in 'calling up' people at the other end of the line, and $50,000 were expended in merely developing a 'call bell.' To do that it was necessary to use an induction coil, or two high resistance coils of fine wire at either end of the line, making four in all. That necessitated a new transmitter, for originally the hand telephone was used as a transmitter and receiver, and the new transmitter called for more resistance coils and a battery at either end of the line. And thus addition after addition has been made, while the telephone principle remains the same as it was originally."

WHY HIGH RATES ARE CHARGED.

"The public is disposed to grumble at the prices charged for the use of telephones, and think that because the company is doing such an enormously large business that it ought, therefore, to reduce rather than to increase, the rates. The fact is, that the telephone business is unique in this respect. It costs more to do a large wholesale than a retail business, and is less remunerative. It is difficult to convince the public of this, but it is, nevertheless, true. To meet the demands of the public expensive additions have been made. The 'call-bell' was a necessity, but it cost money to introduce it. A transmitter was a necessity, and that cost money. Improvements have been made in many directions. Every genius has been encouraged to invent something that would enhance the value of the telephone to the public, and that has cost money. In fact, the increase in expenditures in perfecting and adding to the original invention have been, not in arithmetical, but in geometrical proportion. The original charges were not sufficiently high; consequently, it has been necessary to increase the amount, and unless some device shall be discovered whereby the expenses can be reduced it will be necessary to make a further increase."

COVERS THE TOLL SYSTEM.

"Americans are averse to the tollage system. They prefer to pay a lump sum and to use the telephone as often as they wish, for all sorts of purposes. What is the result? The business man, who has occasion to use his telephone many times a day, pays no more, in most cases, than the man who only actually requires it two or three times a day. A great deal of useless and unnecessary talking is done every day over the telephone. Servants gossip over it to their friends; people call up their neighbors many times when they would not do so if they were charged a certain sum every time they did so. If the tollage system were introduced the number of calls would be reduced; it would require fewer employés to transact the business, fewer wires would be necessary, and in a thousand and one ways would reduce expenses, while the men who did need the telephone frequently for business purposes would pay for it."

UNDERGROUND WIRES.

"The telephone, as at present constructed, needs the open air to obtain the best results. To use wires placed underground a metallic circuit will be necessary, similar to the one used now on long distance lines. To place the wires underground and to make a metallic circuit, which means to use two wires where one is used at present, will materially increase the expenses of the company, and the public must pay for the luxury. As the number of wires is increasing rapidly it is evident that they must, ere long, be buried.

"To simplify the telephone opens a wide field for inventors, for it is in that direction that we must turn. Pay a visit to the central office in Boston, New York or any other large city, and you will be astonished at the complex system which has grown up almost unnoticed within a few years. There is a labyrinth of wires such as no outsider ever dreamed of. The telephone is so simple in itself and the people have become so familiar with its use, that they would be astonished if shown a modern switchboard. It cost $150,000 to construct the switchboard for the central office in New York city, and if you were to see it you would be surprised that it could be constructed for even that large sum.

"Of course, I am not speaking now from the standpoint of the business manager of the telephone. I am merely a stockholder; I have nothing to do with the business management; but it is patent to me and to others that the problem to solve now is, How can the telephone business be simplified and expenses reduced without impairing the efficiency of the service? It is needless to say that business will increase. New subscribers are clamoring daily for the service, and this means more wires, or better facilities for using what we now have."

REMINISCENT.

Some facts in connection with the early introduction of the telephone, familiar to the writer, which were not referred to by Professor Bell, will be of interest to the public, writes Mr. Bryant. Perhaps no invention ever realized and even exceeded the expectations of the inventor so quickly as did the telephone. The inventor did not wait long for his reward. He was embarrassed somewhat at the outset for necessary funds to enable him to place the wonderful instrument before the public, but there was no protracted struggle such as hundreds of originators of valuable machines have experienced, and, unlike most inventors, Professor Bell realized a fortune, as did every man who was sagacious enough to early invest in it and to hold on to his investment.

One of the first to become interested in the telephone was Mr. R. C. Downer, now the president of the Broadway National Bank. He was then a young man employed by his father in the office of Stone & Downer, on State street. He was enthusiastic, and believed that he saw in it a fortune, and he now congratulates himself with the forlorn thought that for once at least his judgment was good, although from circumstances over which he had no control he was unable to realize the millions that were literally thrust upon him 16 years ago. Mr. Hubbard, the father-in-law of Professor Bell, who was financially interested in the invention of his future son-in-law, for Professor Bell was not married at that date, offered Mr. Downer one-fourth interest in the patent for $25,000. Mr. Downer laid the matter before his father and a wealthy friend, but they declined to invest. They told the earnest young man that it was a toy and never could amount to much commercially. So, reluctantly, Mr. Downer was obliged to decline the opportunity to become a millionaire many times told.

The first pay message ever sent over a telephone was sent *via* the line which run from Mr. Downer's residence on Central street, Somerville, to Boston, and that message was sent by Professor Bell to his *fiancee*, Miss Hubbard, in Cambridge. The line was constructed only to Boston, but a messenger boy was paid there for delivering the message to Miss Hubbard in Cambridge.

Data Concerning Platinum.

Baker & Company, of Newark, N. J., have just issued a pamphlet, entitled "Data Concerning Platinum, etc.," which is undoubtedly the most valuable collection of tables and information on the subject that can at present be obtained. Nearly all the tables have been compiled and copyrighted by Baker & Company. There are also several tables of value giving a comparison of the various wire gauges, tables giving the weight per foot of platinum wire in Troy and French weights, weights per square inch of platinum sheet and foil, and a comparison of Troy, avoirdupois and French weights will be of great service to any one who has anything to do with platinum.

MEDICAL ELECTRICITY.

The Electric Light Considered from a Hygienic Point of View—First of a Series of Articles on the Application of Electricity in all its Forms in Medicine and Surgery—A Particularly Interesting Contribution Inaugurates this Department.

CONDUCTED BY DR. J. MOUNT BLEYER, NEW YORK.

My object in bringing this subject before the notice of the medical, electrical and other scientific bodies is simply to show the great importance attached to it. Herein my intentions are to demonstrate why all other artificial lighting should be abolished from all dwellings of whatsoever kind and the electric light substituted.

"Without health, life is not life; it is only a state of languor and suffering—an image of death," says Rabelais.

In early times but a small fraction of our forefathers lives was spent under artificial light. They rose with the sun and lay down to rest shortly after sunset. From that early period, as man has advanced in civilization, in the thirst for knowledge derived from books, and in following the gentle pursuits which demand an indoor life, there has been a steady increase in that fraction of our lives which is spent under light other than that of the sun.

But the improvement in the quality of the artificial light has been very slow. The ruddy lights and picturesque shadows so faithfully handed down to us in Rembrandt's pictures, show us very graphically what our poets have called "the dim glimmer of the taper" of those days. A few years before the introduction of gas, Argand, by his improvements in the burner of oil lamps, enabled our forefathers to see for the first time a comparatively white light.

Prior to the introduction of the electric light we had been accustomed to consider hours spent under artificial light as hours during which all conditions are less favorable to perfect health than they would be during daylight. Can we now hope to ameliorate this condition of things through the agency of electricity? Before this question can be discussed, I must point out the chief differences which exist between hours of work or recreation spent in daylight and under artificial light. In the former case we live in abundance of light. The sunlight itself exercises a subtle influence on our bodies. That mixture of heating and chemical rays which, when analyzed, form the solar spectrum and, combined, form the pure white light of daylight, is needed to enable all animal and vegetable organism to flourish in the fullest conditions of healthful life.

In nearly all cases when the sun is up the functions of life are in the state of fullest activity, and when it sets they sink into comparative repose. In daylight life works; in darkness life sleeps. In addition to the abundance of pure white light, the heat attending sunlight is necessary for health. On the other hand, when working under artificial light we have these conditions altered in degree.

First—We have an insufficient light, as a scale of lighting by gas or by electricity which would be pronounced excessive at night time is still far inferior to average daylight.

Second—All artificial lights, whether produced by combustion, as in the case of candles, oil, gas and petroleum, or by the incandescence of a conductor by the means of electricity, produce heat. This heat, in proportion with the light afforded, is enormously in excess of the heat given by sunlight. Electricity is far the best in this respect, but even it is inferior to sunlight.

Third—All these same illuminants, excepting electricity, contaminate the air and load it with carbonic acid, sulphur and other compounds, all injurious to the health and to the general comfort of the body.

What are the effects it has upon our health in general and our eyesight in particular? That proportion of colored rays which, when combined, form white sunlight, is that best suited to healthy life—is necessary for that sufficient and proper stimulus to the organic changes which go on in our bodies, and which we call a state of good health. The various artificial lights differ very widely from sunlight in this respect, that they are all, more or less, deficient in the rays at the violet end of the spectrum, commonly called the actinic rays, which most probably exercise a very powerful effect on the human body. It is the want of a due portion of these violet rays which makes all artificial light so yellow. Even the light of the electric arc, which is richer in these rays than any other, is still on the yellow side of sunlight. The incandescent electric light is next best in this respect. Next in order comes gas, petroleum and the various oil lamps.

Turning now to the comparative heating, air-vitiating properties of artificial lights, which we shall find it convenient to take together, examine tables below prepared by Dr. Freymolt Lidy, of London, which shows the oxygen consumed, the carbonic acid produced, the air vitiated and the heat produced by the combustion of certain bodies burned so as to give the light of 12 standard candles, to which Mr. R. Hammond has added the heat produced by 12 candle incandescent electric lamps. You will be surprised to see from the table that our old friend, the tallow candle, and even the wax candle, is far worse than gas in the proportion of air vitiated and heat produced, and again will be disposed to disbelieve it; but the fact is that so long as candles were used light was so expensive that it is only since the general introduction of gas and petroleum that we have found what an evil it is.

Tables showing the oxygen consumed, the carbonic acid produced and the air vitiated by the combustion of certain bodies burnt so as to give the light of 12 candle standard, each candle burning at the rate of 120 grains per hour, are here given in the table below:

Burnt to give light of 12 candles, equal to 120 grains per hour.	Cubic feet of oxygen consumed.	Cubic feet of air consumed.	Cubic feet of carbonic acid produced.
Cannel gas	3.30	16.50	2.01
Common gas	5.45	17.25	3.21
Sperm oil	4.75	23.75	3.33
Benzole	4.46	22.30	3.54
Paraffine	6.81	34.05	4.50
Camphine	6.65	33.25	4.77
Sperm candles	7.57	37.85	5.77
Wax	8.41	42.05	5.90
Stearic	8.82	44.10	6.25
Tallow	12.00	60.00	8.73
Electric light	None.	None.	None.

Burnt to give light of 12 candles, equal to 120 grains per hour.	Cubic feet of air vitiated.	Heat produced in lbs. of water raised 10 deg. F.
Cannel gas	217.50	195.0
Common gas	348.25	278.6
Sperm oil	356.75	283.5
Benzole	376.30	232.6
Paraffine	484.05	361.9
Camphine	510.25	325.1
Sperm candles	614.85	351.7
Wax	632.25	388.1
Stearic	669.10	374.7
Tallow	933.00	505.4
Electric light	None.	13.8

It is found not to be of unusual occurrence that the upper stratum of air of the rooms in which we live is heated to 120 degrees after the gas has been lighted for a few hours. If you look again at the table you will see that each gas burner that we use consumes more oxygen and gives off more carbonic acid and otherwise unfits more air for breathing than any human being, and it is this excessive heating and air vitiation combined which are the main causes of the injury to the health from working long hours under artificial light.

Many instances of the fearful state of the atmosphere of some of our public buildings, institutions, hospitals, shops, factories and our private homes after the gas or other lighting has been lighted for a few hours could be given, but suffice it to say that these points herein cited are facts proven experimentally. Thanks to the general introduction of electric lighting, it is already adopted in most of our modern public buildings, ocean steamers, new public hospitals and other institutions, homes, etc. There is no doubt that the public have reached the mature age of knowing and comprehending the value, both from a hygienic and practical point of view, that electric lighting has taken and it must become the illuminant of the ages.

During a musical festival, held in Birmingham, Eng., Mr. Henry Lea, of that city, conducted some careful experiments. He found that when gas was used the temperature near the ceiling rose from 60 degrees to 100 degrees after three hours lighting. The heating effect of the gas was, therefore, the same as if 4,230 person had been added to the full audience and orchestra of 3,100. Similarly the vitiation of the air by carbonic acid was equal to that given off by the breathing of 3,600 additional persons added to the audience of 3,000. But he found on evenings when the electric light was used the temperature rose only one and a half degrees during a seven hours' trial, and the air, of course, was vitiated only by the breathing of the audience.

We all know that the time when we suffer most from the effect of artificial light is in crowded places of public amusement, which are at the same time brilliantly lighted. Many have been unable to go to theatres, or attend evening performances of any kind where other lighting than electric is used, because of the intense headache which invariably attends or follows a stay in such places. This headache, we can only say, is inseparable from the heat and glare of the gas. Now, this phrase is not strictly correct. It is, no doubt, due to the heat of the gas and its air-vitiating properties, and when we use the word glare, I believe we refer to the effect the gaslight has upon our heads, which effect is not due to excess of light; on the contrary, I believe, if a good amount of light be given by the electric light, without the heating and air vitiation being present, such a headache is never produced.

Good light has good effects, even on the temperament. If the experiment is tried in an assemblage of people of gradually decreasing the lighting of the room, it will be found that the spirits of every one will be depressed just as the light is depressed, and *vice versa*. From this the conclusion can be drawn that during the hours of waking every person is benefited by increase of light up to full sunlight, providing that this high degree of lighting is not attended by heat and by air vitiation, and that the source of light must not be from one or two brilliant points only, but it must be well distributed and not such as to cause dark, deep shadows.

What effect has the electric light on the eyesight, as compared with other lights?

Here is an important question to be answered. Healthy eyesight demands a plentiful supply of light. It is the greatest mistake to suppose that a state of semi-darkness is good for our eyes, unless they are defective or recovering from the effects of injury or disease. We know that those whose professions or trades, as painters, engravers, printers, watchmakers or indeed any one, the quality of whose work depends on the excellence of their eyesight, desire a flood of pure white light thrown on their work. No fewer than nineteen-twentieths of the diseases of the eyes arise from working the eyes long hours with insufficient light. Another great cause of injury to eyesight is the unsteadiness of most artificial light. Nevertheless, of the many improvements made in late years by the introduction of all kinds of gas burners, etc., these are not to be compared with the light of the incandescent electric lamp. The electric light is the greatest specific against the premature loss of the function of good eyesight and the premature use of spectacles.

I have made some observations lately regarding the effects that the new illuminant has upon the voices of singers and actors during and after their performance. I am told, after interrogating many of them, what they thought of the effects that the electric lighting in theatres where they perform has upon their voice. Out of 30 of the foremost singers and actors, I am informed that since the introduction of the new light on the stage they are able to preserve their voice in much better condition and are by 50 per cent. more often in a good voice. They are remarkably cooler, don't perspire, are not husky while singing or acting. The atmosphere is much alike, and the equal temperature of the whole building has greatly diminished the risk of taking cold. Their throats are not parched and the voices not injured in comparison when playing in houses where gaslight is used.

It is useless for me further to enlarge on the many conditions of the electric light as it indirectly affects health. I may only name the many additional pleasures of the eye we get from its use. For instance, flowers in our rooms do not fade and are seen in their true colors. Pictures and all colored objects are seen to better advantage. The possibility of being able to turn a flood of light into drawing and dining rooms at six o'clock on a winter's morning, and this without taking away the freshness of the air, so that the whole of the cleaning can be finished as thoroughly as if done by daylight, is one of great advantage. Again, the good effects such a light has upon the health of our children is simply inestimable. No night lights, no matches need be left about, no gas turned down low or the fear of suffocation. A child can be trusted to press a button and so turn the light off or on. The lamps being high and out of reach are not easily broken or overturned, and the air of the children's nursery, even if the light be kept burning the night through, remains pure throughout, and so with the invalids' rooms. Another very important point in favor of its use is the absence of heat. It is comparatively easy to thoroughly ventilate and cool, during the hot weather, a room or public place lighted by the electric light. Draughts by its use are entirely avoided.

With this mode of lighting there is absolutely no danger to life, even if any accident happens to the wires or any other unforeseen accident. As far as ornamentation of fixtures go there are on the market manufactured designs by firms who made this a special branch of their study, which by far excel anything we have had or seen in the gas fixtures or other illuminating conductors.

The only drawback is undoubtedly the slightly higher price of it at present, but if it were a thoroughly acknowledged fact that in paying the very slight difference for the electric light the public were paying for health at the same time, and that every hour of a man's life spent in a room lighted by gas tended to shorten his life and abridge his powers of work, in time the public might change their minds sufficiently to cause them to spend their money on healthful light, as they are now so largely doing on the sanitary and other arrangements necessary to make healthful houses.

The Annual Meeting of the American Electro-Therapeutical Association.

On the first Tuesday in October the doors of the Academy of Medicine will be thrown open for the annual meeting of the American Electro-Therapeutical Association. The members will there hold a session of three days, accompanied by an exhibit which is considered a feature of value. The exhibit will have the patronage of the leading electro-medical instrument makers, as well as demonstrations from leading physicians.

The object of this association is the cultivation and promotion of knowledge in whatever relates to the application of electricity in medicine and surgery. Among its list of fellows are to be found the foremost men in the profession. The association limits its membership to 100. Its list contains 80, and the final number will be completed at this meeting.

Several social gatherings have been arranged for each day. An invitation has been extended to them by Mr. Thomas A. Edison to visit the famous laboratory on the third day, after the session. The Electric Club has the intention and undoubtedly will entertain the association at their club rooms.

There are many important papers to be read; some of them are said to possess marked value, both from a literary and scientific point of view.

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HERE'S A PRIZE!

The ELECTRICAL REVIEW was among the first to apply for space in the Electricity Building of the World's Fair. Now, what shall we do with it? We have our own ideas on the subject, but in order to liven things up a bit, we make the following offer:

To the person sending us the best suggestion as to how we can most profitably exploit the ELECTRICAL REVIEW at the World's Fair, we will give a certified check on the National Park Bank, of this city, for $50.

The only conditions of the contest are that suggestions, addressed to the editor, must reach this office before November 1, 1892, and every suggestion must be accompanied by a year's subscription to the ELECTRICAL REVIEW.

The award will be made by a committee of three well known and disinterested persons.

Let's have a little mild excitement. Send a suggestion and $3 and you may get $50.

The development of the electric railway systems of this country has created a great and constantly growing demand for what are known as "fresh air homes." The suburban resident has had a good deal of fun poked at him, but with the trolley's aid he has the laugh on his urban brother.

ANTI-TROLLEY HUMBUG AGAIN.

When a great metropolitan newspaper like *The Sun* gives editorial prominence to its corroboration of our recent article on the newspaper bosh printed against the trolley, it shows a careful weighing of the subject, which has led it to the only conclusion possible to the honest thinker. We are glad to see that one great paper, at least, has a staff discriminating enough to separate the wheat from the chaff, and honesty enough to set forth its real opinion.

Within a few days another newspaper, which has been reaching out for circulation and advertisements, has been contemptible enough to attempt the sensational about the trolley system, and without the shadow of reason. The New York *Recorder*, not to be outdone by the *World's* "Death Dealing Trolley," fires a volley aimed at "The Modern Juggernaut," and gives a list of accidents by collision, falling off or in front of cars, etc., and, with a burst of silly rhetoric, anathematizes the trolley system as the horrible cause of destruction and death. In explanation of it all, the *Recorder* invents a curious reason for the superior ability of trolley cars to smash things, viz., a trolley car is heavier than a horse car, and, having greater momentum, cannot be stopped as readily as the lighter horse car! The writer of such trash evidently never was on a trolley car in motion when the current was reversed for an emergency stop. He also ignores the fact that, even if the heavier car could not be stopped so quickly, it yet has from 10 to 15 feet margin by reason of the absence of the horses with their iron-shod hoofs frantically planting blow upon blow upon the poor mortal unlucky enough to fall within their reach. Such criticism of the trolley system is wilfully unjust and pernicious. It would be quite as fair and as scientific to get up a crusade against illuminating gas, because it will not stand the lung test of safety given by the Verdant Greens, who are bound not to do the simple act of turning off the gas.

The Sun takes the right view and states the disagreeable truth in saying "there has been a great deal of dishonesty and nonsense in what some newspapers have printed about the trolley system."

The "one sound and serious objection," mentioned by *The Sun*, "to taking a current of high voltage from overhead wires in a city" is well answered by the paper itself, though the answer is not quite accurately put. Improved practice divides the trolley wire into independent insulated sections, in some localities only 500 feet long. Each such section is supplied with current from the insulated feeder-wire. In the connection from feeder to trolley wire is placed a simple switch, usually located in a box conveniently arranged on one of the poles. The fire department has access to the switch-boxes, and when a fire occurs of such character that its prompt suppression threatens danger of shock to the firemen from the trolley wire, the switch can be thrown and the trolley wire in question cut away from the electric system absolutely, and can then be touched and handled the same as if it were a span of hemp rope.

In many places, too, practice is leaning towards an independent feeder for each of the insulated sections of trolley wire, with a switch on the pole and another at the power house. This, with means of telephoning to the power house in case of fire, takes away the last vestige of objection, for, in case of fire, not only the trolley wire can be disconnected from the feeder, but the latter can, away back at the power house, be cut loose from the source of current. But we can go further. Methods of construction are so well understood, and emergency gangs so well trained in modern electric railway practice, that, in the event of a very serious fire, requiring plenty of room for the play of streams, the trolley wire can be cut down for a sufficient distance, and still the remainder of the electric railway system can be operated fully and without serious inconvenience to the traveling public. In such an event rapid transit by cable is absolutely stopped, since cars arriving at the vicinity of the fire cannot go back on the same track, and cannot be derailed and put over on the other track on account of the grip. Under the same circumstances trolley cars can be readily shunted over on the other track, or can go back on the same track, and thus keep going for the public accommodation.

Sensational newsmongers may as well accept the inevitable, and keep their venomous pens off the trolley, for it is here for business.

MEDICAL ELECTRICITY.

While the development of the many applications of electricity to the social, business and industrial world has been marvelously and rapidly progressing, a scattered band of faithful scientists and experimental workers has been slowly but surely making advances in the adapting of electrical devices, apparatus and principles to that oldest of all sciences, medicine. This band of workers have been, for the most part, members of the medical profession, and number as yet but a small part of the whole fraternity. They have been naturally separated from each other, and only at intervals have they been able to effect an interchange of views before some medical society. A few of them have recently formed an association of their own. But they have been practically unrepresented, as literature on the subject of electro-therapeutics is almost wholly confined to a few addresses read before societies.

The medical profession recognizes the fact that electricity has a legitimate place in their science as a curative agent of great flexibility and present value with much promise for the future. In response to a large number of requests from physicians and surgeons of this and other cities, the ELECTRICAL REVIEW has decided to establish a department devoted exclusively to the applications of electricity to medicine and surgery.

We have engaged the services of Dr. J. Mount Bleyer, the eminent specialist of this city, who will conduct this department. Dr. Bleyer has made a special study of electro-therapeutics and his original experiments with the phonograph, the electrically lighted laryngoscope, and various electrical devices have made his name well and favorably known. The first article in the series to be published in this department appears in this issue and is entitled "The Electric Light Considered from a Hygienic Point of View."

This department will be so conducted that the physician, the surgeon, the electrician and the lay reader will be interested and instructed. It is perhaps unnecessary to state that electric belts, electric brushes and the like quackery will receive no mention at our hands, unless it be in the exposure of a fraud.

The physicians and surgeons of the country cannot afford to lose the knowledge which a perusal of the articles in this department will develop, and electrical manufacturers will find it to their best interests to keep in touch with the progress made in electro-therapeutics.

AN ILLOGICAL CRITIC OF THE TROLLEY.

The editor of the New York *Recorder* is a very bright and original young man, but he seems to have lost his head over the electric trolley. Hear him froth at the mouth as follows:

"The famous Hindoo Car of Juggernaut, which rolled annually over its voluntary victims, was not more regular in its demand for human sacrifices than is the ghastly trolley car which is now rolling up its yearly list of slaughtered and maimed men, women and children in several of our American cities."

Indeed! If you will be honest enough to consider facts, you will learn that 98 per cent. of the accidents you mention were not due to electricity, but were due to the same causes that prevail with horse, cable or steam traction.

"Full of ominous suggestion for the people of Brooklyn, who are soon to be under the absolute rule of King Trolley, is the statement which we print elsewhere in this paper of what a harvest of death has been reaped from the system in Boston. 'Scarcely a week,' says the *Recorder's* correspondent, 'has passed without a horrible accident in which some human being has been crushed into a shapeless mass.'"

Permit us to express our belief that your correspondent lied. Also to ask why "King Trolley" is expected to prevent passengers from being heedless and careless? That is as gigantic a task as it would be to attempt to supply certain demagogic editors with wisdom and common sense.

"It will doubtless be as difficult in Brooklyn as it has been and is in Boston to start an outcry against the trolley system after it has once got a foothold. The sinister combination of capitalistic and political influences that has served to introduce it will work hard to retain it."

The above paragraph concludes our quotations from the *Recorder's* editorial on this question, and has such a baby-like squeak that we think the writer has suddenly realized that he is fighting against an improvement that the people who ride want—not so much the politicians and the capitalists as *the people*. See?

If the *Recorder* can announce a community of passengers who, having tried the trolley, wish to return to horse cars, it will greatly strengthen its outcries and add weight to its sadly illogical arguments.

There are ways of attracting attention much more sensible than to stand in the path and hurl stones at movements of progress.

We are gratified to announce that Dr. Henry M. Field, editor of *The Evangelist*, will publish at an early day a revised edition of his "History of the Atlantic Telegraph." The recent deaths of Mr. Cyrus W. Field and Mr. F. N. Gisborne recall attention to one of the greatest achievements of modern times. Although the credit of the idea for a submarine telegraph must be given to Gisborne, it required all of the tremendous energy and unflagging zeal of a Field to bring the idea to a successful accomplishment. Henry M. and Cyrus W. Field were probably associated as closely together as two human beings can be, and no fitter or better qualified author of a history of Cyrus W. Field's great work could be found than Dr. Field. The book was originally published in 1866, and it is proper that a complete story of the laying of the Atlantic cable, revised up to the present, should be provided for the edification and instruction of generations to come.

We submit that it might be a good idea for the gentlemen engaged in the electrical business in New York city and vicinity to organize two campaign clubs representing the Republican and Democratic parties, with the principal object of forming marching battalions to take part in the coming political parades. Electric lighting features would, of course, be a prominent part of the uniform and equipment of these politico-electric soldiers, and with very little drilling a handsome showing could be made. The Electric Club could undoubtedly be secured as a headquarters.

Now that Mr. Nikola Tesla has returned from Europe, we may expect to hear of greater and further advancements in his work with alternating currents of high frequency.

LETTERS FROM A LABORATORY.—XI.

BY JULIAN A. MOSES.

A knowledge of the manufacture of glass apparatus is of the utmost importance in the laboratory. I shall mention a few of the most important manipulations calculated to give one a general idea of the value of the art. It is needless to expatiate on the many advantages to be obtained from a thorough knowledge of glass blowing. Many experimenters would give considerable to be adepts in the art. But, like anything else, it requires time and labor to accomplish anything with it. Experimenters have said to me: "How I wish I could blow glass and be independent of the expensive glass-blower." The only answer I made to this was: "Why don't you try? You cannot accomplish anything by wishing." They do try, and are often surprised at their skill and what they can accomplish in a short time.

It is not easy to obtain information on this subject, as the glass-blowers of to-day are not very generous in giving information. The following is the result of an intimate acquaintance with one of the best glass-blowers in the country.

There is not a great quantity of apparatus necessary to blow the most difficult kinds of chemical glassware. An ordinary blast lamp, a medium size bellows and a generous supply of glass tubes of different bores and qualities. You will not need any tube larger than an inch and a half in diameter, and none smaller than the so-called "seltzer tubing." If you intend to do any extensive work, I would advise that you get a small reservoir that will hold about three cubic feet of air. This is, however, not absolutely necessary where you are supplied with a large bellows and strong reservoir.

The lamp should be screwed on a strong table, which should be stood in some dimly lighted corner, away from draughts and other disturbances. The table should be large enough to allow space on either side of the lamp to accommodate your tools and tubing, and to rest the elbows to steady you while at work. A piece of sheet steel that has been tempered glass hard and sharpened on the edge will serve for cutting off different lengths of tubing. This is better than a file, as it gives a clean cut which enables you to separate the glass by pulling and bending it *away from the scratch*. It is not necessary to hold the tube in a cloth to protect the fingers, for if the scratch is deep enough, and you pull and bend at the same time, the tube will separate easily. Always make the scratch at right angles with the axis of the tube, for, unless this is done, the tube will crack unevenly. A few carbon rods sharpened at one end, and a flat piece of battery carbon, about five inches square, will be all the tools that you will need. There are other accessories that will be of value to you when you are expert, but of these later.

I presume that you are anxious to make some of the simpler pieces of apparatus, such as test tubes, decomposing tubes, experimental incandescent lamps, distilling apparatus, etc., and it requires but patience and experience to make almost anything when once these simpler articles are constructed.

There are elementary exercises in glass blowing that are just as important to that art as the scales to music, or discipline to an army. In fact, nothing can be accomplished without these preliminary exercises. Success does not come immediately, and do not expect to accomplish anything for quite a while. Neither Rome nor glass-blowers were made in one day.

The following exercises are the most important and should be practiced continually until an approach to perfection is obtained.

Try first to obtain a perfectly steady flame. Always have on a full supply of air, and regulate the size of the flame by the amount of gas admitted into the lamp. The elbows should rest on the table, at the side of the lamp, so that when seated, your hands come on a level with the hottest part of the flame, which is just where the inner blue flame ends. The tube should rest in the hands so that the left hand grasps the tube with the fingers up, that is, the tube rests on the right hand and is held by the left hand. This has been found to be the best way to hold the tube, in order to obtain the most satisfactory results. It is of primary importance that the tube be heated evenly. This can only be accomplished by repeated trials. Be careful to rotate the tube always in one direction when it is stiff, and when soft, you should be quick in rotating back and forwards, so as not to "double on the tube, thereby heating two opposite points on the tube more than the other parts. If by accident the tube has been so heated, it is advisable to allow it to cool slightly, and try again. Never put a thick tube immediately into the flame, as it is liable to crack, but warm it gently before.

The first exercise is to draw handles on the tube. In order to accomplish any work with glass tubing it is necessary to have handles with which you can hold it. These handles must be centered: for if they are not, when you rotate the tube, it will become unevenly heated, and spoil all attempts at making anything. To make these handles, it is necessary to heat an even ring around the tube where you wish to draw it out. When the glass has become cherry red, or even less hot, remove it from the flame, never stopping for an instant the continual turning, and gradually draw it apart, not too quickly; slowly at first, and then, as the glass grows cooler, pull stronger until you can feel that the tube is stiff, then pull very hard. This last pull makes the handles straight, and prevents them from sagging, which if they did would necessitate other handles being drawn on the same or another place, as it is absolutely essential that straight and accurately centered handles be obtained in order to do good work.

When you have made enough, that is, when you feel that you are able to make them properly, then proceed to the next exercise, which is to remove one of the handles in order to have a rounded surface at one end of the tube; such as is on the end of a test tube. It will be difficult to remove the little nipple of glass that will persist in remaining on the end, but this difficulty may be overcome by the following method. Turn off the gas until you have a small flame, and heat an even ring around the base of the tube just where the handle begins. The glass will begin to "sink" or melt together; when this takes place push in the handle, which should be held in the left hand, and quickly removing it from the flame, draw out the handle until only a thin filament remains. This will melt back into the main body of the glass tube, and in order not to thicken it at that point, the tube must be heated again and blown slightly into. The strength and volume of this blast from the lungs can only be correctly estimated by the operator, for there are many conditions that arise, such as the quality of the glass, the heat to which it has been brought, the thickness of the tube, etc., that affect the circumstances and render it impossible to give explicit directions. Repeated trials will bring success and enable you to proceed to the next exercise, which is that of blowing bulbs and globes.

Niagara Falls and Electricity.

TO THE EDITOR OF ELECTRICAL REVIEW:

What will probably be the first attempt to use power from Niagara on a large scale and at long distances is likely to materialize here very shortly. A company has been formed with a capital of $3,000,000 to construct some 200 miles of electric railway in distances of 25 to 60 miles, and to supply light, heat and power to the towns and cities along each line. It is intended to make Hamilton the center of the system and bring the power here at a very high voltage, possibly 25,000, which is recommended by Messrs. Brown, Boveri & Company, after their experience at Lauffen Falls. The company will, as far as possible, use existing roads, fencing off what is required for single tracks and using large trolley cars and trailers. The lines have been partly surveyed, and it is expected that the whole system can be completed early next summer. Considerable attention will be devoted to the supply of power for manufacturing, and they will also endeavor to introduce it largely for cooking and heating. J. P.

Hamilton, Ont., Aug. 30, 1892.

Death of F. N. Gisborne.

THE MAN WHO CONCEIVED THE IDEA OF A SUBMARINE TELEGRAPH.

Frederick N. Gisborne, who gave Cyrus W. Field the idea of a submarine telegraph, and for many years superintendent of the Dominion Government Telegraph and Signal Service, died on August 30, at Ottawa, Ontario. Mr. Gisborne was the inventor of a number of electrical and other appliances of value, and was one of the original members of the Royal Society of Canada.

F. N. Gisborne was born in Broughton, Lancashire, Eng., March 8, 1824. In 1842 he started on a tour around the world, which lasted nearly three years. He finally settled, in July, 1845, in Canada, as a farmer. He had a keen interest in telegraphy, and in 1847 he deserted his farm for a place in the office of the Montreal Telegraph Company. Not long afterward he opened the first office of the company in Quebec. He advanced rapidly, and in 1850 he was the chief officer of the Nova Scotia Telegraph Company.

It was at this time that he conceived the idea of a telegraph line to connect St. Johns, N. F., with the main continent. He figured that if St. Johns, the most easterly point in America, could be brought into electric connection with the mainland, news could be received 48 hours in advance from Europe over the system then in vogue. Resigning his office with the Nova Scotia Telegraph Company, he obtained land grants and organized the Newfoundland Electric Telegraph Company. Then he set out upon the survey, which lasted three months. He succeeded in making this survey, although beset by many hardships, and came to New York to obtain financial aid. He succeeded in interesting capital in this city. In 1852 he laid the first submarine cable of any length put down in America, from Cape Ray to Prince Edward Island.

In 1853 his backers in New York deserted him, and he found himself hopelessly involved in a project which he had not the means to carry out. He was even arrested and imprisoned for the debts contracted by the company, and only succeeded in regaining his liberty when he had sacrificed every dollar he had in the world. But he still clung to his project, and in 1854 he returned to New York to renew his efforts.

It was at this time that he met Matthew D. Field, a brother of Cyrus W., who was a civil engineer and a railroad builder. Through him he was introduced to Cyrus W. Field, who had retired from active business shortly before. Mr. Field was disinclined to listen to the Canadian enthusiast, but gradually he became interested. The interview between the two men took place in Mr. Field's library, and Mr. Gisborne traced the route of his proposed telegraph line on a revolving globe which stood in the room. Speaking of this meeting, Henry M. Field says: "After he (Mr. Gisborne) left, Mr. Field took the globe, which was standing in the library, and began to turn it over. It was while thus studying the globe that the idea first occurred to him that the telegraph might be carried further still, and be made to span the Atlantic Ocean."

From this grew the work which finally ended in the Atlantic cable being laid. Mr. Gisborne took an active part in the undertaking, and it was under his charter that the Transatlantic Telegraph Company first began operations.

After the cable was finally laid, Mr. Gisborne was appointed Superintendent of the Dominion Government Telegraph and Signal Service, an office that he held until his death.

Brown & Sharpe's Universal Cutter and Reamer Grinder.

The Brown & Sharpe Manufacturing Company, of Providence, have issued a new and revised edition of their valuable pamphlet on their universal cutter and reamer grinder. The reading matter has been entirely re-written for this edition, and over one-third of the cuts are new. This pamphlet is of interest and value to any mechanic and can be obtained free of charge upon application.

The World's Fair.

PROGRAMME OF CEREMONIES ATTENDING THE DEDICATION OF THE BUILDINGS OF THE WORLD'S COLUMBIAN EXPOSITION, OCT. 20, 21, 22, 1892, AT CHICAGO.

When the Congress of the United States authorized the commemoration of the four hundredth anniversary of the discovery of America by an international exposition, to be held in Chicago during the summer of 1893, it also provided that the exposition buildings should be dedicated on the 12th day of October, 1892, with "appropriate ceremonies." Subsequently, by act of Congress, this date was changed to October 21, 1892.

Aside from the international interest in this fitting prelude to the magnificent picture of the world's progress that will be presented in 1893, this dedicatory service will furnish an opportunity for the world to behold the extent of the preparations which are being made for the exposition.

The task of preparing a programme of ceremonies which will appropriately herald the greater spectacle commemorating the discovery, development and progress of the new world, has been a work involving great care and the consideration of many difficulties. The following programme of the dedicatory exercises and incidents connected therewith is submitted as the result of this thought and purpose:

The evening of Wednesday, October 19, a grand reception will be tendered the President of the United States, his cabinet and other distinguished guests at the Auditorium. After the close of the ceremonies on each of the three succeeding evenings, there will be magnificent pyrotechnic displays.

THURSDAY, OCTOBER 20, THE CIVIC CELEBRATION.

The first day will witness an imposing procession, indicative of peace, contentment and prosperity, participated in by civic organizations, which will be reviewed by the President of the United States, his cabinet, the Congress and other honored guests.

In the evening, at Jackson Park, amid myriads of electric lights and other displays, a water pageant. "The Procession of the Centuries," will move through the beautiful water-ways of the Exposition grounds, illustrating with beauty and historic accuracy some of the great facts of history connected with the discovery of America, such as the condition of this country prior to the landing of Columbus; striking events in the life of the great discoverer; important epochs in American history and the world's progress in civilization. The vessels upon which these tableaux will be represented vary from 40 to 53 feet in length, modeled after the naval architecture of the period represented; for example, "Columbus before the Court of Spain," will be represented upon a vessel modeled after the lines of the "Santa Maria."

The following subjects will be illustrated:

1. Aboriginal Age; representing the American Indians.
2. The Stone Age; representing the Cliff Dwellers.
3. The Age of Metal; representing the Aztecs, their religious rites, manners and customs.
4. Columbus at the Court of Ferdinand and Isabella.
5. Departure of Columbus from Palos.
6. Discovery of America.
7. Columbus before the Court of Ferdinand and Isabella, presenting natives and the strange products of the new country.
8. English Cavaliers and the settlement of Jamestown.
9. Hendrick Hudson; discovery of the Hudson River; Dutch settlement of New Amsterdam.
10. Landing of the Pilgrims, and illustrations of early Puritan life.
11. Ferdinand de Soto; discovery of the Mississippi.
12. The French explorers. Pierre Marquette, Chevalier La Salle and the Northwest.
13. Washington and his generals.
14. Signing of the Declaration of Independence.
15. Union of the colonies; the 13 original States; the sisterhood of the Great Republic, welcoming the territories to the constellation of the States.
16. "Westward the course of empire takes its way."
17. The genius of invention; application of steam, etc.
18. Electricity and electrical appliances.
19. War; representing valor, sacrifice, power, death, devastation.
20. Peace; representing tranquility, security, prosperity, happiness.
21. Agriculture.
22. Mining.
23. Science, Art and Literature.
24. The Universal brotherhood of man; equal rights, law of justice; Liberty enlightening the world.

FRIDAY, OCTOBER 21, DEDICATION DAY.

The National salute at sunrise will inaugurate the ceremonies of Dedication Day. The President of the United States, his cabinet, members of the Supreme Court, members of the Senate and House of Representatives, distinguished foreign guests and governors of the different States and territories, with their official staffs, will be escorted by a guard of honor composed of troops of the United States Army, detachments of the United States naval forces and regiments from the various State National Guards, to the Manufactures and Liberal Arts building, in which the dedicatory exercises will be held.

At one o'clock in the afternoon in this building the following dedicatory programme will be carried out under the direction of the director-general:

1. Columbian March. Written for the occasion by Prof. John K. Paine.
2. Prayer by Bishop Charles H. Fowler, D D., L.L.D., of California.
3. Dedicatory Ode. Words by Miss Harriet Monroe, of Chicago; music by G. W. Chadwick, of Boston.
4. Presentation of the master artists of the exposition and their completed work, by the chief of construction.
5. Report of the director-general to the World's Columbian Commission.
6. Presentation of the buildings for dedication by the President of the World's Columbian Exposition to the President of the World's Columbian Commission.
7. Chorus, "The Heavens are Telling." Haydn.
8. Presentation of the buildings for dedication by the President of the World's Columbian Commission to the President of the United States.
9. Chorus, "In Praise of God." Beethoven.
10. Dedication of the buildings by the President of the United States.
11. Hallelujah chorus from "The Messiah." Handel.
12. Dedicatory oration, Hon. Wm. C. P. Breckinridge, Kentucky.
13. "The Star Spangled Banner" and "Hail Columbia," with full chorus and orchestral accompaniment.
14. Columbian oration, Chauncey M. Depew, New York.
15. National salute.

At the close of this programme a special electric and pyrotechnic display will be given, with a repetition of "The Procession of the Centuries."

SATURDAY, OCTOBER 22, THE MILITARY CELEBRATION.

A series of military manœuvres and parades will constitute the main portion of the day's programme. In the evening attractive and appropriate celebrations will be provided, followed by a magnificent display of fire-works.

A number of brilliant social entertainments will be given by the citizens of Chicago during the three evenings of the dedication celebration.

Thomson-Houston Workers Opposed to a Union.

There is a movement in an embryotic state to confederate the electrical workers in the employ of the Thomson-Houston works, Lynn, and to that end a preliminary meeting was held in that city yesterday afternoon. The attendance was meagre, and the indications are that the plan of organization will be abandoned, temporarily at least. Henry Miller, president of the National Brotherhood of Electrical Workers, and John O'Sullivan, of the Boston Seamen's Union, were present to urge the necessity of forming an organization of the 3,000 Thomson-Houston employés.

The insignificant number of responses to the call issued for the meeting is explained by the statement that there is a general feeling prevalent in the ranks of the Lynn electrical workers which is very much averse to large unions as ordinarily conducted, a sentiment which the collapse of the Winders' Union is largely responsible for.

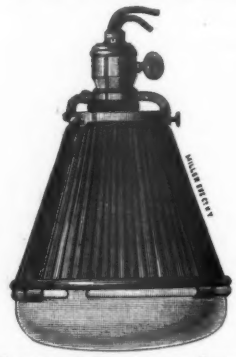
There are no differences pending settlement between the Thomson-Houston Company and its employés, and all disagreements are settled without the intervention of labor unions. The larger number of workmen employed are skilled artisans, who are fearful that a general organizing of the employés would in time sever the friendly relations between the corporation and its large force of men. This feeling accounts for the apathy manifested yesterday.

Since 1882, the date of the establishment of the Thomson-Houston plant, there has never been a serious rupture between the company and its skilled help. — *Boston Herald.*

Paradox Reflector Shades.

The F. Holman Electrical Company, 128 Pearl street, this city, are the manufacturers of the "Paradox" reflector shades, one type of which is shown in the accompanying illustration. The company, in a recent circular describing these shades, speak of them as follows:

"The advantages of the form of reflecting shades here illustrated are many and important; but they are also so clear and self-evident that they do not need any elaborate or lengthy description. By the use of this combined reflecting and diffusing shade, the light given out by the incandescent electric lamp is not only wholly utilized, but it is so directed and diffused that the resulting illumination is absolutely perfect. This is true whether concentration of the light upon a small, or general illumination over a large, area is required. They are specially recommended, however, to all users of the incandescent electric light who find objection to it either on the score of the glare from unprotected lamps, or deficiency in the quality of light, or of the unequal reflection from ordinary shades showing itself in varying streaks and shadows, often very annoying where work demands concentration. All who have used these diffusive reflector shades are enthusiastic in their praise, and recommend them in flattering terms. We



"PARADOX" REFLECTOR SHADE.

beg to call special attention to the superiority in design, construction and price of the shades which we illustrate and offer. They are made in two parts (enabling them to be easily taken apart and cleaned), the upper half being of metal, the reflecting surface of which is highly polished, nickel-plated tin, corrugated so as to best distribute the light, and the lower half, a ground or etched glass bowl or dish, made with a rim which fits into suitable locking clamps attached to the upper half. This construction gives superior strength, durability and lightness. The glass is the only part breakable, and this can be replaced for 50 cents."

This company manufactures other specialties, including shade holders and portable desk fixtures.

Charles D. Shain.

Mr. Charles D. Shain, for several years eastern district manager for the Edison General Electric Company, resigned that position on September 1, and has established himself as an electrical engineer and manufacturer's agent at Room 303, Electrical Exchange building, this city. Mr. Shain has been appointed selling agent for the Weston Electrical Instrument Company, of Newark, N. J.

Mr. Shain's abilities as an engineer and all-around electrical man are of that order which admits of no doubt of the successful accomplishment of anything he may undertake. His friends, and he has hosts of them, will be glad to know that he is to remain a New Yorker, and the ELECTRICAL REVIEW joins with them in wishing and predicting for Mr. Shain the largest measure of success.

Mr. Shain's active connection with Prof. Weston's company is a good starter; it is the combination of a standard man with a standard product, which the Weston instruments have proved themselves to be.

Direct United States Cable Company.

In order to afford greater facilities to the mercantile community in and around Mark Lane, London, especially to produce and milling brokers, the Direct United States Cable Company has opened a new chief office at 39 Mark Lane. This office will be open always for business, and is directly connected with the cable terminus on the other side, between which and New York there is only one transmission.

The Three Important Steps in the Invention of the Most Constant and Economical Electric Battery.

BY G. D'INFREVILLE.

The first step in the history of the constant electric battery was made in 1826 by Becquerel, in France, who, in order to remedy the defect of constancy due to electric polarization, invented the battery in which two liquids were separated by a porous partition. He used nitric acid on one side and a solution of potash on the other, with a platinum strip in each liquid. He obtained a much more constant effect.

In 1829, starting from the same principle and wanting to utilize the very energetic oxydation of the zinc, while avoiding the effects of electric polarization, he found that the most favorable liquids for this double action were the sulphate or the nitrate of copper and a neutral soline solution. It was the first battery having a practically constant electromotive force. During the operation of this battery, fresh copper is constantly deposited upon the copper plate, which thus remains practically constant as to its surface, while the zinc electrode gradually decreases both in surface and weight.

He continued to use it with the most satisfactory results and it is this battery which is to-day used under the name of Danieli, though Daniell in England made public the one which bears his name fully seven years later.*

The second step was made in 1851 by Callaud, watchmaker, at Nantes, in France, who, taking advantage of the difference of density between the concentrated solution of sulphate of zinc, suppressed the porous cup of the Becquerel battery and produced the well-known Callaud gravity battery, which is still simpler, more economical, constant and less resistant than the former.

The zinc electrode of the Callaud gravity battery, however, went on decreasing with usage until about half consumed, when it had to be replaced by an entire new electrode.

Hence a course of variation in its internal resistance which prevented the battery from being really constant.

I submit that the "wasteless" gravity zinc, hereinafter described, has practically filled this gap, and that the third step in view to obtain a battery constant both as to electromotive force and internal resistance has been at last realized, not only without sacrifice of any of its qualities, but with decided advantages besides.

THE D'INFREVILLE BATTERY.

There has been up to the present time a great waste of zinc in all the batteries, owing to the fact that the zinc electrode must be removed before it is entirely consumed, the current having become too weak on account of the increased internal resistance due to the decreased size of said zinc electrode, and no practical or economical remedy has been found to entirely avoid said waste, which in the case of the best patterns of zinc gravity battery, often reaches 45 per cent. of the total weight of zinc purchased (1¼ pounds being wasted out of 3¼ pounds of zinc); for, as a matter of fact:

1. In many places the stumps which constitute said waste cannot be used to any advantage nor sold, for want of a purchaser at that place, and it would not pay to gather them and to ship them to a place where they could be disposed of.
2. In frequent cases, that of telegraph companies, for instance, but about 20 per cent. of said stumps can be gathered with trouble and expense from scattered and distant places, as proved by actual experience.
3. Said stumps, even when all collected, can at best be sold as impure metal at but about half the price of spelter.

So that, to resume, in the first instance, the waste may reach fully 45 per cent., while in the second case, but one-half of the value of said 20 per cent. of gathered stumps being recovered, the ultimate loss will amount to about 40 per cent., and in the third, or most favorable case, where one half of the value of the stumps is recovered, the loss will still amount to about 22 per cent.

The object of the invention of the "wasteless" zinc is mainly to entirely avoid said waste of zinc.

The invention consists in using for the zinc electrode a number of pieces adapted to be connected to one another in column by joints or connections which are liquid tight or adapted to preserve the connecting parts from

* "Philosophical Transactions," 1836, p. 106.

the action of the battery liquid, so that a partially consumed piece may be connected or attached to the bottom of a fresh or new piece, which latter, after being partially consumed and after the still greater state of consumption of the first one, may, in its turn, be connected under and to a new piece, and so on.

In time the lower piece of zinc will have been *entirely consumed*, then in turn the one directly above it and to which it was attached, and so on, so that practically every piece of zinc introduced in the battery will in its turn be entirely consumed, which fact has been repeatedly confirmed by experience. This is why it is called the "wasteless" zinc.

This arrangement and process is shown in perspective in Fig. 1, which represents one complete gravity element fitted up with the "wasteless" zinc electrode, and which consists first, of a new zinc piece suspended from a hanger connector resting on the rim of the jar so that said zinc pieces bathes about half way in the sulphate of zinc solution, of a second piece of zinc partially consumed and suspended from the first one, and of a third piece or stump of zinc almost entirely consumed and suspended from the second piece. The two last zinc pieces are entirely below the upper level of the battery solution.

Fig. 2 is a cut of the three pieces constituting said zinc electrode, showing their relative positions and, as far as can be done by a cut, their comparative sizes, due to the

FIG. 1.

state of corrosion of the two lower pieces which depends on the length of time they have been in use.

The manner in which a "wasteless" zinc piece, whether new or partially worn out, is fastened to another one placed above, makes it perfectly secure, both as regards contact and guarding against any possibility of dropping down on the copper electrode below; for, said fastening is obtained through the wedging by a small twisting motion combined with pressure, or rather by a light blow, the slightly conical socket provided at the bottom of the upper zinc, Fig. 3, over the correspondingly tapered complementary stud or shank provided at the top of the zinc, Fig. 4, which is to be placed under.

The guarding against corrosion from the solution is also perfectly secure, as the socket below each zinc is in fact an inverted cup and cannot allow, any more than a diving bell would, the access of liquid against its inside walls.

The latter operation connects the two zinc pieces together so strongly that they cannot be torn asunder when pulled straight apart, while a twist combined, if necesssary, with light tapping sideways on the radial branches can easily loosen them when desired.

The conical stud or shank above and the conical socket below each "wasteless" zinc are made to uniform gauge, and such as to leave about one-quarter inch distance between two zincs when the branches of the upper one are exactly over the branches of the one below Figs. 1 and 2, which position permits the introducing of the blue vitriol and the use of the hydrometer; said gauge will be preserved in the future for this size of zinc, so that the stud or shank of a zinc previously bought will always fit into the conical socket of a newly purchased one.

It is a simpler and cheaper method than connecting them by a screw thread, which is, however, also shown in the patent. The present friction conical attachment has proved to be quite effective and reliable in practice.

A new feature with the "wasteless" zinc is that the radial branches are slanting downwardly from their supporting trunk, Figs. 1, 2, 4, so that they will wear out gradually from their extremities (Figs. 1 and 2) which are lower in the solution or nearer to the copper electrode towards their point of support, which latter is higher in the solution or farther from the copper, Fig. 1, and thereby less acted upon chemically; the branches will thus become entirely consumed before their support be itself too much corroded.

This is not the case with other patterns of gravity zincs whose branches get sometimes cut off from their support and fall to the bottom of the jar, where they cause, besides a waste of zinc and blue vitriol, a hurtful local action, or if not cut off, are liable to get broken off and wasted when the zincs are being cleaned.

Another advantage secured by the downward slanting of the branches of the "wasteless" zinc is that some of the hydrogen gas runs up from under the branches towards the socket under the trunk of the zinc (Figs. 2 and 3) where it helps to preserve it from corrosion and wherefrom it bubbles out from time to time when in excess, while it leaves the branches more free

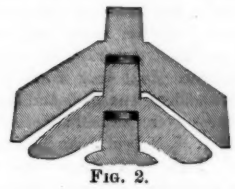


FIG. 2.

to be acted upon by the solution than is the case with the other patterns where they are horizontal, and where, therefore, the gas gathers to a too great extent and stays too much under the branches themselves.

The slanting direction of the branches furnishes at the lower part of the zinc a space which a partly worn out piece or stump will fill advantageously (Figs. 2 and 3), so that the zinc electrode will be more even at its lower part (Figs. 1 and 2.)

From the start one single "wasteless" zinc (Fig. 4), or if a greater amount of current, or, technically, a greater amperage is needed, two "wasteless" zincs, one on top of the other, can be suspended in the same jar, the upper zinc from a hanger connector which rests on the rim of the jar (Fig. 1), and the lower zinc under the upper one as explained before.

Should some nearly consumed piece, or stump, resulting from some former use of the battery be at hand it could be wedged under said single new zinc or under the lower one of said pair of new zincs (Figs. 1 and 2) according to the case.

The "wasteless" zinc, or zincs, must always be placed upright in the solution so as to not allow the latter to prematurely wet, soil or corrode any socket.

For the first time in the history of electric batteries of whatever kind the "wasteless" zinc furnishes, by its own form, means for perfectly connecting and fastening firmly together two or more new or partially worn out pieces of zinc (Figs. 1 and 2), without the help of mercury or the adjunction of anything else, below the outside level of the battery solution and beyond the possibility of being corroded by it.

This radical departure brings with it, besides the possibility of totally consuming zinc, several other advantages, some of which are of paramount importance, as will be explained.

It is equally suited to operate circuits of high resistance, such as one single long or a few long telegraph lines, in which case one single "wasteless" zinc per cell will suffice at first, or to work from the same battery, with two pieces in each battery jar, three times as many similar lines as it was possible to do before with the same size of gravity battery under the same circumstances, but when they were provided with other patterns, as the internal resistance per cell when two "wasteless" zincs are used together in each jar, is thereby reduced to about one-third (0.7 ohm) of what it is now with other well-known patterns, under the same and best circumstances.

As a new "wasteless" gravity zinc can at any time be put over or cap another partially

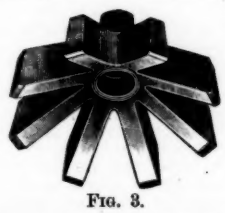


FIG. 3.

consumed one, (Figs. 1 and 2), there is no occasion for hesitating, as before, about the proper time to replace, as is the case with all the other patterns, a partially worn out zinc, for fear that doing it too soon would entail too great a waste of metal, or that doing it too late would allow the internal resistance of the battery to so increase as to fail to produce the necessary amount of current or amperage with all its possible bad consequences.

By the use of the "wasteless" zinc both aims will be secured at the same time: long before any doubt arises as to a possible insufficiency of current caused by a "wasteless" zinc getting too small, a new one can be capped over the old one (Figs. 1 and 2) when a full current can still then be depended upon while the full wearing out of the old zinc is secured at the same time.

This special property, possessed by none but the "wasteless" zinc, is of the utmost value in many cases, as for fire alarm telegraph, railroad telegraphs and signals, police telegraphs and alarms, and whenever the utmost reliability outweighs any other consideration.

The sulphate of copper (blue vitrol or blue stone) battery, though the most reliable up to the present time, was still lacking to a great extent in this particular respect.

The "wasteless" gravity zinc has filled this want, with its other valuable features besides, as herein described.

Among the immediate beneficial results derived from the lower internal resistance due to the simultaneous using of two "wasteless" zincs, one under the other, and one stump under the lower zinc in the same jar (Figs. 1 and 2) is the saving of 50 per cent. in the expense of now superfluous jars and coppers, of 50 per cent. in amount of room required and of 40 per cent. in total battery weight, and also the resulting savings of money and time in packing, handling, shipping, storing and attendance, with the reduction of risks, delays, etc.

With two "wasteless" zincs one under the other, and a stump below them in the same jar (Figs. 1 and 2), the internal resistance falls to 0.7 ohm per cell (the electromotive force being 1.0 volt as usual), giving a current of about 1½ amperes; they are, therefore, well suited for operating circuits of moderately low resistance, such as local telegraph circuits, for electroplating and the working of small motors, in which case one single cell equipped with two "wasteless" zincs will do about as much work as three cells of most other gravity batteries, alike in every respect except as regards their well known zinc electrodes, which necessarily are single and generally placed further away from the copper electrode.

The projecting stud or shank of the "wasteless" zinc being less than one inch in length and in diameter (see Fig. 4), and free from holes, is strong and less liable than any other of its parts to get broken in handling or transportation, which cannot be said of the longer, more or less hollow, and thereby weaker shank or shanks of other well-known patterns, which are often thereby rendered useless at their arrival, and thus cause great inconvenience or losses.

FIG. 4.

The radial branches of the "wasteless" zinc (Figs. 3 and 4), are, to the number of eight, all alike, and separated one from the other by an angle of 45 degrees; they are sufficiently short (2¼ inches), and thick (from three-eighths inch at the top to one-quarter inch at the bottom) to not be easily broken, which accident often happens with other well known patterns.

Yet the accidental breaking of one branch of the "wasteless" zinc would only take away about one-eighth of its total branch surface, while the breaking of longer branches in other patterns, which is much more likely to occur, deprives the zinc of a comparatively greater amount of surface.

The downwardly direction of the "wasteless" zinc branches (Figs. 1, 2 and 3) facilitates the cleaning, as it furnishes better access between said branches than in the case of other well known patterns.

The cleaning is also easier because said angle (45 degrees) between two adjoining branches in the "wasteless" zinc (Fig. 4) is much greater than the angle between two adjoining branches of some other well known patterns, while the fact of their slanting downwardly greatly facilitates the access of the cleaning tool to the summit of said angle, and also because said branches in the "wasteless" zinc being shorter than the branches of some other well known patterns, are not so liable to break on account of being always less worn out at any place nearer to the trunk than at any other place situated further from the said trunk.

The "wasteless" zincs, when packed, are superposed on top of one another in piles of 10, which process is not practicable with most of the other patterns. A small metal ring of proper dimensions is placed around the stud of each zinc to prevent its being untimely wedged into the socket of the zinc placed directly above; they thus occupy much less room than other patterns and are easily packed in a crate of wood, cheaper and more convenient than a box; said packing is also lighter and easier to handle, thereby avoiding, besides a great cause of breakage while loading or unloading, which operations are a serious cause of damage with other well known patterns.

Said crate packing permits also to examine the contents of the package without any opening, as with boxes, which is often very convenient.

Five or ten, as desired, of the hanger connectors can be easily and safely packed with 10 "wasteless" zincs at the upper part of said crate. Five or 10 coppers, if needed, can also be packed with 10 "wasteless" zincs at the lower part of the crate and be there maintained by an extra strip of wood not shown here.

No other pattern of gravity zinc takes less room and material for its packing and storing.

It must not be forgotten that with the "wasteless" zinc there is no packing, shipping and storing as with all the other patterns of about 45 per cent. of metal entirely useless to produce electricity; and there is no occasion to have later on any such useless metal then with impurities, gathered, packed and shipped back (when practicable), with the expenses involved thereby, to be sold at about half the price of spelter as impure metal.

Its use is indicated for telegraphing and telephoning; it is especially valuable for railroad signalling, and for fire, police and other alarms, and in general whenever there is need of economy or reliability in the service, or both.

It has enabled the sulphate of copper (blue vitriol or blue stone) gravity battery to be now economically applied to the operating of printing telegraphs, the running of small electric motors, electroplating, medical apparatus, the charging small accumulators, etc.

The hanger connector for the "wasteless" zinc is made simply of two pieces of brass fastened together, has no screw whatever, weighs but about two ounces and takes little room. Figs. 1 and 5.

It provides a broad elastic and tight connection all around the stud of the "wasteless" zinc, which it supports, Fig. 1. On one side it is triangular, so that the whole rests by three points on the rim of the jar, giving sufficient steadiness to the zinc suspended therefrom while its edgewise position gives it all the rigidity necessary to safely support at the same time two or more zincs connected in a pile. Figs. 1 and 2.

Its triangular end serves also to fasten and securely lock either a wire or a metal strip, not necessarily by their end as when a screw with hole is used, but at any place, from the smaller magnet wire to the largest telegraph office wire, always with a nearly uniform pressure, ample contact and an elastic-locked grip not liable to get loose as is the case with a screw connection. Figs. 1 and 6.

It cannot crush the connecting wire out of shape, nor break it, as may happen with a screw.

It does not strain the edge of the glass jar and does not tend as a hook to break it. Fig. 1.

It renders the connecting and disconnecting easier and quicker than with a screw, an advantage often very important as in large battery rooms or in emergencies. Figs. 1, 5 and 6.

There is no more screw to pay for and waste with each zinc, as the hanger connector, costing but a few cents, will serve for many successive "wasteless" zincs.

There is also no more screw to get lost or broken or so tight as to challenge unscrewing, which accidents often render the other patterns useless, sometimes when mostly needed.

The cleaning of the hanger connector for

FIG. 5.

FIG. 6.

the "wasteless" zinc is also much easier than that of a screw connector; a simple washing with water, following by rubbing and wiping dry, will generally suffice. If deemed necessary, the blade of a penknife or a rather smooth file in the shape of a knife blade will easily brighten the inside space where the wire is connected.

Should no penknife or knife-file be at hand, the straight end piece of another hanger connector can serve to scrape said space.

It can also, in an emergency, be used as a scraper to clean the zinc itself.

The twisting motion imparted to the hanger connector around the stud or shank of the "wasteless" zinc when the connecting is done, or the twisting motion imparted to the new zinc over the one to be capped will insure a good contact.

ELECTRICAL PEOPLE WE MEET.

Mr. Henry Hine, the able and energetic manager of the Stanley Electric Manufacturing Company, of Pittsfield, Mass., although a young man, is one of the pioneers in electrical work. Early in the eighties he allied himself with the United States Electric Lighting Company and was for several years associated with Messrs. Warren and Shain in the management of the Chicago office of that company. Returning to New York in 1885, Mr. Hine assumed the management of the sales department, with Mr. Geo. W. Hebard as president. When the Westinghouse interests purchased the United States Company, Mr. Hine was appointed district manager over the most valuable territory possessed by the allied companies, and proudly acquitted himself, building up a great business and organizing a staff of capable workers that has never been excelled. In the beginning of the nineties Mr. Hine decided to enter business for himself, and, with his talented cousin, Mr. W. Stanley, Jr., organized his present company and is meeting with that success that might have been expected of one possessing his ability and industry, and who had a good thing, electrically speaking, to supply to the public.

A. H. Chadbourne, of Philadelphia, with the General Electric Company, began his electrical career in Boston with the Sprague Company, and has been an active worker in electric power circles from the time the motor was first projected. Mr. Chadbourne was in New York last week and reports a very good demand for his new "Complete Electric Railway Directory," which was recently published and which contains much valuable data relating to the electric railways of every State in the Union.

J. C. Chamberlain, formerly with the Edison Company, afterwards with the Sawyer-Man Company, has been devoting himself of late years to a study of the practical work of the storage battery, and is considered one of the best informed electrical engineers of the day in that branch. Mr. Chamberlain has kept abreast of the latest work of electric traction in all its departments, and is a practical electric railway man of such ability as will very likely call him to the service of some one of the big electric railway corporations, where men of absolute reliability and experience in this comparatively new work are in demand. In the line of invention Mr. Chamberlain has delved, and is the owner of several important electrical patents as well as patents in other branches of industry.

E. Wilbur Rice, Jr., for several years past general superintendent of the Thomson-Houston factories, has recently been appointed director of the engineering and experimental department of the General Electric Company. In this capacity he will have charge of the entire engineering force of the consolidated company, and will be held responsible for the types and designs of apparatus and supplies manufactured at the Lynn, Schenectady, Middletown, Cleveland and Fort Wayne factories. The office of director, in a technical sense, is a new one in this country, and is created by the appointment of Mr. Rice. He will continue to act as the executive head of the Lynn factories although his new position will occasion a great deal of traveling. Mr. Rice was the second employé of the old American Electric Manufacturing Company, Professor Elihu Thomson being the first. He is about 30 years of age, a pleasant man to meet and possesses great technical, mechanical and executive ability.

BI-POLAR.

GENERAL NOTES.

The entire street railway system of Anderson, Ind., will be operated by electricity.

A telephone exchange will be established at Saranac Lake, N. Y., the popular Adirondack resort.

It is expected that the gross earnings of the West End Street Railway for August will aggregate between $550,000 and $560,000.

An electric railway will be built from New Britain to Plainville, Conn., and another may be built from New Milford to Bridgeport, Conn.

The telegraph cable between Ellis Island and the Battery was ruptured in two places last week, presumably by dragging anchors. A crew on the cable tug "Western Union" went out to repair it.

Western Union Telegraph Company officials state that the Western Union Building and Loan Association, of Kentucky, is a Chicago concern, and has no relation whatever with the telegraph company.

The United States Electric Lighting Company has filed a mechanic's lien for $22,613 against Mary J. Van Doren, owner of the Holland House, at Fifth avenue and Thirtieth street, this city, for apparatus furnished to the hotel building.

The Reading, Pa., Electric Light Company has completed its new stack in the rear of its works on South Seventh street. It is 125 feet high, and over 150,000 brick were used in its construction. The old iron stack will be taken down at once.

The Central New York Telegraph Company is putting an addition to its line running from Utica to Richfield Spa, Cooperstown and Oneonta. In place of the single wire which does the business now, there are to be 12 wires. This is owing to an increase of business.

The Springfield, Mass., Electric Light Company has finished putting in its new 500 horse-power engine, and is preparing to have a 300 horse-power dynamo set by the Thomson-Houston Company in about six weeks, to furnish additional power for the street railway company during the winter.

The Stanley Electric Manufacturing Company, of Pittsfield, Mass., has appointed a committee from its board of directors to consider whether the company should erect buildings of its own, what buildings would be necessary and what locations could be obtained. The members of this committee are Wm. Stanley, Jr., Charles Atwater and W. A. Whittlesey.

The Kansas City, Mo., Elevated Railroad is now in possession of the new company. All employés will be retained and the work of the new company will start out smoothly. The new cars for the electric equipment will arrive soon and the electrical system will be put in operation as rapidly as possible. With this change Col. D. M. Edgerton retires from the management of the road, the old Interstate Consolidated Rapid Transit Company passes out of existence, and the Kansas City Elevated Railroad Company becomes its successor.

The old-time telegraphers will meet in Omaha, September 14. The local committees are now perfecting arrangements for the reception of the guests, who are expected from all parts of the country. Mr. E. Rosewater and Mr. L. M. Rheem of the committee on transportation called at the various railroad headquarters recently to arrange for cars to take the old-time telegraphers on an excursion to the mountains. It is proposed after the meeting at Omaha that the majority of the members make a flying trip to Denver and swing around the famous loop.

The Chicago Telephone Company has almost completed the purchase of 110x105 feet on the southeast corner of Pacific avenue and Harrison street, from Carter H. Harrison, at a price not far from $110,000. The negotiations are said to be awaiting only the action of certain members of the executive committee who are out of the city. Work on the removal of the half dozen dilapidated old structures on the ground has been under way for several days. It is believed that the company is preparing to erect a plain but substantial building of modern height, to be specially adapted to telephone uses.

Commissioner Simonds, of the Patent Office, has submitted his annual report to the Secretary of the Interior for the fiscal year ending June 30, 1892. The report shows that during the past year there were 45,945 applications for patents and caveats received. There were 23,626 patents granted, including reissues and designs. Trade marks, 1,563, registered, and six labels registered. Twelve thousand, four hundred and twenty-seven patents expired during the year. The receipts during the year amounted to $1,268,727, and the expenditures were $1,114,134, leaving a surplus for the year of $154,593.

The new owners of the Seattle, Wash., Gas, Electric Light and Motor Company have assumed the management and taken charge of the property. Col. G. M. Nelson, an attorney of St. Paul, R. C. Elliott, a capitalist who has recently removed from that city to Seattle, and John Mather, general manager of the Water, Light and Power Company, of West Superior, Wis., have arrived in Seattle. Last week a meeting of the new stockholders was held and the following trustees were elected: Hon. H. G. Struve, Col. G. M. Nelson, John Mather, R. C. Elliott, L. Turner. These trustees then elected the following officers: President, Hon. H. G. Struve; vice president and general manager, John Mather; secretary and treasurer, L. Turner.

Electrical Illuminations for New York City.

In view of the fact that 24 prize medals are to be awarded by the Columbian Committee of this town for the finest illuminations on the night of October 11 next, says the New York *Evening Sun*, one reads with interest of the performances of St. Louis in this direction. The development of the electric light renders possible effects of this sort never before within the reach of man. Of past efforts it is impossible to think without the picture of Nero's human candles rising before the mind. At Columbus' own time and for generations after the savor of burning Christian flesh arose as an offering at once pleasing to the Giver of good and appropriate to occasions of public festivity. The old malignant despotism is represented to-day only by the tongue of Mrs. Grundy, a mugwump press and a few notoriety hunting pulpits.

St. Louis, we read, displayed in electric lights a representation of Columbus' carvaca, the "Santa Maria"; at another place the flags of the United States and Spain were wrought in colored lamps; in another the Western Hemisphere was shown. It is needless to repeat the detail. The series of these illuminations was to number twelve. No wonder that the streets lighted "were densely packed till late." Probably the excursion trains which were run from the country never brought patrons to witness a display more beautiful or memorable. The prize medals to be awarded by the New York committee will be not for illuminations alone, but for decorations. Hotels, clubs, business and private houses are all eligible to compete. In view of the greater success and taste which have accompanied displays of this sort among the color loving peoples of the Mediterranean, the *Sun* the other day suggested that some of these fellow citizens be invited to confer with the art committee of the Columbus celebration. A sub-committee has now been appointed to prepare a book with illustrations and information for persons who desire to illuminate their houses. This book will be given away at the secretary's office in the Stewart building, Broadway and Chambers street.

And upon this general participation by the whole town depends the success of the illumination more than upon the whole of the set pieces combined. Brilliant, artistic and beautiful as these may be, the 2,000,000 or more of single lights that must turn the night into a softer day are imperative to success. The display needs to be not a mere show, such as might be got up under contract and paid for by municipal money, but a spontaneous and general demonstration of popular feeling. One street susceptible of the finest effects from its width is the Bowery, and near the Bowery live many thousands of citizens who are among the most keenly conscious of what the discovery of the New World stands for to mankind. The elevated railroads ought to be heard from, at that point at least. The municipal buildings will do credit to the city's taste and liberality. Excursion trains for the occasion will doubtless be arranged for. No pains, it is to be believed, will be spared to celebrate the most momentous event of modern times with fitting splendor. The event ought to be one taking permanent place in the annals of New York. There is no occasion to doubt that it will in fact realize the liveliest dreams that will be formed of it in anticipation.

A Great Electrical Illumination in St. Louis.

An Associated Press dispatch from St. Louis, under date of August 26, says that "the first of the 12 street illuminations to be given in St. Louis this season by the Autumn Festivities Association was had the previous evening. Of a total of 75,000 lights in the arches and electrical panorama, upward of 68,000 were burning for over three hours, and on the arrival of a carload of colored globes delayed by the Eastern strike, the deficiencies will be supplied and every light will burn next Thursday evening.

"The greatest success is a huge globe 75 feet from the ground, studded with 3,000 electric lamps, which, revolving, presents in outline every country of the world in blazing light. Another success is a series of electric displays illustrating the discovery of America. On one arch are transparency portraits of all the presidents from Washington down; another has a large view of Washington's face and a third that of Columbus, while the Grant statue is surmounted by flags of the United States and of Spain wrought out in colored electric lamps.

"A statue, a *fac-simile* of the Bartholdi, is backed by a huge representation of the caravel "Santa Maria," also wrought in electric lights, and to the north of these is an outline of the Western hemisphere, surmounted by a blazing star and the dates 1492 and 1892. The series of 12 illuminations will cost over $100,000, and are successful from the start. The streets lighted were densely packed until late, and street and car facilities were severely taxed. Excursion trains were run from the country.

The Volt, The Ohm and The "Empire."

The question is often asked since the Electric Light plant has started, what the word "volt" means. Wishing to please the people, the vigilant Representative of the *Empire* consulted the latest Webster's Dictionary and found that the word volt was a unit of electrical motor power. It is the electric motion force produces a current of one ampere in a current having a resistance of one ohm and is about one-tenth less than the electro motive force of a Daniell's sulphate of copper cells.

The above is so plain that one must naturally like know what an ampire is, so he consulted the latest edition of Webster and found the following.

An ampere is the standard unit of current electrical measurement. It is the current produced by an electro motor force of one volt acting in a current having a resistance of one ohm, formerly called a current of "one weber per second."

The foregoing was so plain that he thought he would look for the word volt. This he felt certain would give the information. Webster in his late edition gave us the following facts, and, as Col. Brustche says, they are as clear as mud. The word volt, according to Webster means as follows:

The standard unit of electrical motive power. It is the electric motive force which produces in a current having a resistance of one ohm, and is about one-tenth less than the electro motive force of Daniell's sulphate of copper cells.

Thus our people will easily understand what "volt, ampere and ohm" and other learned terms mean. They can say to the agent, "Please give me six volts, 500 ohms, and throw in about a thousand or so amperes." The dictionary is so plain that if a few volts, amperes and ohms extra were put in, a person would not know the difference. —*Pierce City, Mo., Empire.*

WORLD'S FAIR NOTE.

The World's Fair buildings will be dedicated on October 21, instead of October 12, Congress having passed a bill to that effect. October 21 is the exact anniversary of Columbus' landing, allowance being made for the correction in the calendar made by Pope Gregory. The change of date of dedication was made in the interest of chronological accuracy, and also to oblige New York city, which will have a Columbian celebration on October 12.

ADVANCE INFORMATION.

New Electric Companies Formed and Important Constructions Projected.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week:

Electric Railways.

JERSEY CITY, N. J.—The Penn City Development Company; capital, $2,000,000. Incorporators, John V. Bacot, of East Orange; Charles B. Ludlow, of New Brunswick; Arthur L. Fairchild, of New York city; Stuart Lyman, of Englewood. The company is incorporated for the purpose of building, operating and aiding the formation of street and electric railways.

EASTON, PA.—The Easton and Bethlehem Electric Railway Company has obtained a franchise to build an electric railway between the towns named.

DETROIT, MICH.—The Wyandotte line of the Suburban Street Railroad Company is likely to be operated by electricity. Negotiations for a new plant are now in progress.

WESTPORT, MO.—David Jameson, C. L. Dobson and others have been granted a franchise for a street railway.

ISLE OF SHOALS, N. H.—A Boston syndicate, headed by C. D. Wainwright, has purchased the Isle of Shoals and will build an electric road encircling the islands, an electric light plant and a telephone line.

EUREKA, CAL.—It is announced that the local company will construct an electric railroad from Elk river through Eureka to Arcota, a distance of 16 miles.

MARQUETTE, MICH.—Preliminaries are practically complete for the construction of an electric railway between Marquette and Negaunee. The distance is 13 miles.

NEW ROCHELLE, N. Y.—The trustees will hold a meeting to consider the application made to them for the construction of an electric street railway through the village.

ST. LOUIS, MO.—The Forest Park and Clayton Electric Railway Company has awarded the Fruin-Bambrick Construction Company the contract for the construction of an electric railway from Union avenue to Clayton.

JOPLIN, MO.—Articles of association of the Southwestern Electric Railway Company, capital, $500,000, have been filed by Harrisburg, Pa., capitalists. The company is organized to buy the Joplin, Webb City and Carterville street railways, and to build a line between Joplin and Webb City connecting them.

INDEPENDENCE, MO.—The franchise of the Citizens' Street Railway Company has been declared forfeited, and a new franchise is to be put up for sale.

NEW ALBANY, N. Y.—The owners of the street railway system of New Albany, which includes what is known as the Daisy line, will petition the city council for the privilege of substituting electricity for mule power and steam. The cost of the proposed change is estimated at $80,000.

DENVER, COLO.—The commissioners of Jefferson County have granted a franchise to Henry Lee and Oscar Reuter for an electric line between Highlands and Golden.

CHICAGO, ILL.—The Jefferson and Norwood Park Electric Railway Company is actively engaged in securing right of way along the route of its proposed road. Stockholders in the Chicago and Proviso Railway Company are behind the enterprise.

LYNN, MASS.—A survey in the interests of the North Shore Traction Company has been completed between this city and Salem, with the result that the company has decided to build an electric railway between the two cities. The North Shore Traction Company is the name assumed by the syndicate who purchased the Lynn Belt Line, the Lynn and Boston, and the Naumkeag street railway companies.

RICHMOND, VA.—The Richmond City Railway Company will equip its Marshall street car line with electricity.

SAN FRANCISCO, CAL.—The North Beach and Mission Railway Company had expended about $200,000 when injunction suits stopped the work. The company expects these suits to be settled soon and will then expend about $750,000 in addition. The line is to use electricity.

PITTSBURGH, PA.—The Aspinwall Street Railway Company, capital, $12,000, has been chartered. The line will be operated by electricity and will be about two miles in length. John B. Jackson, John J. Holmes, Wm. R. Holmes and George C. Wilson, of Pittsburgh, and James J. O'Donnell, of Allegheny City, are directors.

RED LION, PA.—George Darlington and others are active in the organization of an electric road to connect this place, Lenape and Unionville.

NASHVILLE, TENN.—The Overland Dummy Railway Company has been authorized to change its system to electric power.

CADIZ, O.—A movement is on foot to build an electric railway from Cadiz to Unionville, a distance of three miles.

Electric Light and Power.

BROOKLYN, N. Y.—H. M. McKibbee has obtained franchises for lighting Glen Cove, Bayville, Glen Head and Sea Cliff by electricity. Contract for the plant has been awarded to the Thomson-Houston Company.

MADISON, WIS.—The Four Lakes Light, Heat and Power Company has purchased the plant of the Madison Electric Company, and will extend and improve the electric light system.

DAWSON, PA.—An electric light company has been organized by James and P. G. Cochrane.

PLANO, ILL.—The Plano Electric Light and Power Company; capital, $25,000. Incorporators, E. L. Henning, Albert H. Sears and J. R. Steward.

HEMPSTEAD, N. Y.—The Queens County Electric Light Company; capital, $100,000. Incorporators, William A. Vail, Brooklyn; Z. Latshaw, New York; and Charles R. Truex, Montclair, N. J.

PINCKNEYVILLE, ILL.—The Pinckneyville Electric Light Company; capital, $2,250; Incorporators, H. P. Huntsinger, Thos. S. Campbell and others.

ST. MARY'S, O.—The contract for putting in an electric light plant in this city has been awarded to the Brush Electric Light Company, of Cleveland. The company bid $10,940.

HEPPNER, ORE.—Heppner Light and Water Company; capital, $40,000. Promoters, Harry V. Sales, Thos. W. Ayers and James D. Hamilton.

DEER LODGE, MONT.—The McKechney Milling Company; capital, $300,000. Promoters, John McKechney, John McKechney, Jr., and Frank E. Corbett.

NEWARK, N. J.—The New England Power Company; capital, $100,000. Promoters, R. D. Morse, Jr., W. R. Weeks, L. H. Miller.

DECATUR, ILL.—Piatt Electric Company; capital, $100,000. Promoters, John H. Culver, Elmer E. Gibson, Richard F. Piatt.

IRON RIVER, WIS.—An effort is being made to organize an electric light and water company at Iron River with a capital of $50,000. With adequate fire protection several new brick blocks are assured, and the town will be rebuilt.

WADENA, MINN.—Charles Nonthfass & Sons have been granted a franchise to build an electric light plant.

EL DORADO, KAN.—The El Dorado Gas and Electric Light Company; capital, $40,000. Directors, A. Gilbert, S. M. Gilbert, J. Ketner and S. T. Shull, all of Minneapolis, and W. F. Groom, of El Dorado.

KANSAS CITY, MO.—The Kansas City Consolidated Lighting Company has petitioned for a 30-year franchise to take the place of the State franchise of the Kansas City Gas Light and Coke Company.

CROOKSTON, MINN.—Hugh Thompson has formed a company with $50,000 capital to build a new electric light plant or gas works.

DECKERTOWN, N. J.—Sussex Electric Light Water and Power Company; capital, $7,000. Promoters, J. D. Simmons, B. W. Decker, H. D. Van Baasbeck, C. A. Wilson, S. M. Young and others. Incorporation papers sent to J. F. Conklin, Deckertown, N. J.

VAN WERT, O.—The Electric Light and Power Company: capital, $50,000. Promoters, G. L. Marble, L. Milsheimer, F. W. Parmont.

Increase of Capital Stock.

LANCASTER, PA.—The Edison Electric Light Company has voted to increase its capital stock from $35,000 to $250,000 for the purpose of improving its plant.

PITTSFIELD, MASS.—The capital of the Stanley Electric Manufacturing Company has been increased from $50,000 to $100,000.

Manufacturing Companies.

CHICAGO, ILL.—The Mosher Electric Company; capital, $64,000. Incorporators, J. A. Mosher, Joseph R. Begg and E. M. McKenney.

HARVEY, ILL.—The Harvey Electric Company; capital, $10,000. Incorporators, Frank O. Young, Joseph C. Bloodgood and G. P. Waring.

ROCKVILLE CENTER, L. I.—The South Side Electric Company; capital, $30,000. Directors, John J. Randall, Chas. L. Wallace, Wm. Foreman, Henry P. Libby and John W. De Mott.

TROY, N. Y.—The E. G. Bernard Company, of Troy, has been incorporated to manufacture electrical and other machinery and appliances; capital, $15,000. Directors, E. G. Bernard, K. B. Dowsley, F. L. Stevens.

TRENTON, N. J.—The Acme Storage Battery and Manufacturing Company has been incorporated. Its capital stock is $5,000,000. The incorporators are George C. Warner, C. T. Griffin and William L. Barker, of New York; Jacob Herbert Potts, of Jersey City, and W. M. McDougall, of Orange. The object of the company is to purchase and deal in storage batteries and generators and erect a plant to carry on the business.

BURLINGTON, KAN.—The Electric Appliance Company; capital, $2,000. Directors, Wm. Harrington, Benj. Harrington and R. Wingrent.

CLEVELAND, OHIO.—The Universal Electric Company; capital, $25,000. Directors, W. J. Possons, N. S. Possons, C. H. Gale, F. H. Goff and W. F. Carr.

A Receiver Asked For.

ST. JOSEPH, MO.—A petition has been filed in the Circuit Court asking for the appointment of a receiver for the entire street railway system of St. Joseph. The style of the suit is William M. Harriman, Nicholas Fish and Oliver Harriman *vs.* People's Street Railway and Electric Light and Power Company. The plaintiffs in the case are Eastern stockholders in the system and are said to be heavy creditors of the company. The papers were served upon Manager Van Brunt and the local directors of the company on August 26, and a hearing of the case will be had before Judge Raney, in chambers, at once. The bonded indebtedness of the entire system is $800,000, and the plaintiffs claim that if the directors are permitted by due course of law to reorganize the system this indebtedness can be wiped out and the system made to pay expenses.

Telephone and Telegraph Companies.

ALBANY, N. Y.—The New York Submarine Cable and Telegraph Company has just been incorporated. It proposes to construct and operate lines of telegraph, telephone and submarine cables from New York southwest to Norfolk, Va., and thence to the West Indies. The extreme points to be connected are New York, Cuba and San Domingo. The capital stock is $10,000, and the directors are Victor Vallette, Scoville C. Williams, Oscar Mahle and Charles H. Tanner, of New York; William Geery, of Bayonne, N. J.; Frank M. Arquimbau, of Brooklyn, and John Hoge, of Zanesville, O.

KANSAS CITY, MO.—An ordinance before the common council gives the Missouri and Kansas Telephone Company a 30 year franchise to put its wires underground.

GALESBURG, PA.—The local telephone company is to reconstruct its lines and will contract for 380 poles and 190 miles of wire.

Why Depew and Porter Joked Lowry.

"Some of you St. Paul people seem to think you haven't much influence with the street railway company," said a Minneapolis man as he greeted a St. Paul friend on the corner yesterday. "But if you want to know how hard it is to move the company just ask Mr. Lowry to relate his little experience at the banquet given by the Sons of the American Revolution to Horace Porter and Chauncey Depew.

"Mr. Lowry had arranged to have a special car to take the guests of the evening and others—two carriage loads of Minneapolis people—over to the West Hotel. When the banquet was over the party drove in carriages down Western avenue to the interurban line. There was no special car in sight, and the hackmen would not drive another step toward Minneapolis. So Mr. Lowry and party piled out in the mud and waited for an interurban car. When it came along Mr. Lowry hailed it and got the reply, as the car went flitting by: 'Take the next car; we're late!' So they waited about the middle of the block, and when the next car came along, about 15 minutes later, the conductor yelled, as he went by: 'Walk to the crossing; we're late!' It was beginning to be a little late for Mr. Lowry and his party, but they went up to the crossing and caught the last car.

"'Does this car go through to Minneapolis?' said Lowry.

"'No, sir,' said the conductor.

"'Well, it's going through to-night,' said the president of the City Railway Company.

"'Is it?' replied the conductor. 'I guess not. We're working over-time.'

"Lowry tried the motorneer, but with the same result. By this time Depew and Porter had realized the situation, and the president of the New York Central smiled pityingly, and remarked to Mr. Lowry:

"'You don't seem to have much influence with this company!'

"They kept it up, and the whole party 'guyed' Lowry all the way out to the transfer, where he found the special train. So you needn't wonder that it is hard to get anything out of the City Railway Company."—*St. Paul Pioneer Press.*

KINDRED INTERESTS

Orders for incandescent lamps at the Germania Electric Company's Marlboro, Mass., factory for the present month exceed in number those of the same month last year.

The Western Electric Company, Chicago, has sent out a handsome catalogue describing and illustrating its arc lighting apparatus. A complete system of arc lighting in all its details has been worked out by this company.

H. Ward Leonard & Company, Electrical Exchange Building, New York City.—The position that is occupied by H. Ward Leonard & Company is one which is very popular with purchasers of electric railroads and electric lighting plants. A bulk electrical contractor who undertakes the entire equipment of the plant, and turns it over to the purchaser complete in every respect, relieves the purchaser of a great deal of responsibility and annoyance, and insures the rapid execution of the work, without the division of responsibility which always is met with when various contractors are operating upon the same plant.

A Noble Fleet.—The four steamers of the Providence and Stonington Steamship Company, now plying the waters of Long Island Sound, are well described as marvels of marine mechanism and magnificence, as they are unrivaled in elegance and present such superior accommodation and perfect service that it is impossible to surpass them. The famous "Connecticut" and "Massachusetts" are running on the Providence Line between New York and Providence, and the new steel steamers "Maine" and "New Hampshire" on the Stonington Line between New York and Stonington. The management of this popular steamship company are receiving plaudits on every side for the manner they have been conducting their line this season. They have earned the laurel for good, honest, faithful endeavors for the comfort, convenience and safety of passengers. That their efforts are appreciated is shown by their largely increased passenger travel during the present season.

New England Courier.

Under the auspices of the German Engineering Association, of Boston, "Der Deutsche Technische Verein," Dr. Wm. W. Jacques, chief electrician of the American Bell Telephone Company, will give a lecture on electricity, illustrated with experiments, the 5th of October, at 8 o'clock, in the Berkeley Hall, corner Tremont and Berkeley streets. The lecture will be delivered in English. Tickets, at 50 cents, are for sale at the following places: C. Schönhoff, 142 Tremont street; F. B. Teuthorn, 775 Washington street; *New England Courier*, 325 Washington street.

As Dr. Jacques is one of the leading electricians of the United States, a large and generous attendance on the part of the German and American public is confidently expected, especially as a portion of the proceeds will be set aside for the benefit of the Kindergarden of the Blind, South Boston.

LITERARY.

We have received the double number of "Transactions of the American Institute of Electrical Engineers" for May and June, 1892, containing reports and addresses read at the annual and general meetings.

Nicholas Paine Gilman gives a brief *resumé* in the September *New England Magazine* of the results of the experiments in profit sharing that have been made in the United States. Mr. Gilman is an authority on this subject, and his article will interest all business men and wage earners.

Inventors and the Patent Office.

[From the New York *Sun*.]

Every year, when we scan the reports of the patent office, we are impressed with the figures that give proof of the never ending activity of the inventive genius of the American people. We have now the report for the fiscal year ending with June last, and from this it appears that during that year the very large number of 23,626 patents were granted and 16,361 more were applied for, so that the office granted at the rate of 454 patents every week all through the year. It would be necessary for us to print the whole of the patent office report to give a proper knowledge of the bearing of these facts upon industry and production, upon the public economies and the increment of the resources of the American people, upon our country's power, well-being and advancement. American inventiveness has wrought wonders in the world, from the day of Robert Fulton and Eli Whitney to those of Robert Hoe and Thomas A. Edison. Its ingenuity and energy at this time are greater than they ever were at any past time.

Go ahead, inventors! with your study of the elements, the forces and the mysteries of nature. There are discoveries yet to be made such as ordinary people have never thought of, but which the worldlings of the twentieth century and other centuries will chuckle over. We hope they won't laugh too much at the ignoramuses now snooping around the world who don't know how to make things go, or to work them up, or to utilize them properly. We are ready to confess, here and now, to those of our posterity who may be around New York a hundred years hence that we might have done better if we had known more.

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ONE 50 or 110 Volt Incandescent Dynamo of about 10 or 20 lights. Must be in good A No. 1 order. State how long been used, and manufacture, etc.
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For Sale.
ONE Rice Automatic Steam Engine, 35 horse-power, 290 revolutions, 46 in. fly-wheel, 10 in. face; all nicely nickel-plated; and one 48 in. x 14 ft. steam boiler, 56 three in. flues, 26 ft. x 24 in. stack, 1,100 brick. The above has been in use four months in electric light plant; all in good working order. For further particulars, address,
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Planers, 16 in. x 16 in. x 3 ft.; 20 in. x 20 in. x 4 ft.; 24 in. x 24 in. x 6 ft.; 30 in. x 30 in. x 6 ft.; 36 in. x 36 in. x 10 ft.; 42 in. x 42 in. x 12 ft.; 44 in. x 48 in. x 22 ft.; 60 in. x 49 in. x 24 ft.
Friction Shapers, 15 in., 16 in., 20 in., 22 in., 32 in.
Crank Shapers, 6 in., 8 in., 10 in., 12 in., 13 in., 16 in., 17 in., 20 in., 24 in., 28 in.
Screw Machines, Nos. 1, 2, 3, 4, with or without Wire Feed.
Screw Machines, Nos. 5, 6, 7, 8, Power Feed.
Presses, Nos. 51, 52, 53, Ferracute; Nos. 1, 2, 3, Stiles & Parker.
5 Lincoln Pattern Millers, No. 2.
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